VOL. VIII MARCH 1957 NO. 3

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Published Monthly by
the Armed Forces Medical Publication Agency
Department of Defense

Editor
CAPTAIN BENNETT F. AVERY, MC, USN

Associate Editors
COLONEL ROBERT S. ANDERSON, MC, USA
COLONEL PAUL V. DAVIS, USAF (MC)

Assistant Editor
LIEUTENANT FRANKLIN M. ROBERTS, MC, USNR

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1957

THE PRINTING OF THIS PUBLICATION HAS BEEN APPROVED BY
THE DIRECTOR OF THE BUREAU OF THE BUDGET, 20 FEB. 1956

Monthly Message

From the Oath According to Hippocrates in so Far as a Christian May Swear it

"Blessed be God the Father of our Lord Jesus Christ, who is blessed for ever and ever; I lie not.

"I will bring no stain upon the learning of the medical art. Neither will I give poison to anybody though asked to do so, nor will I suggest such a plan. Similarly I will not give treatment to women to cause abortion, treatment neither from above nor from below. But I will teach this art, to those who require to learn it, without grudging and without an indenture. I will use treatment to help the sick according to my ability and judgment. And in purity and in holiness I will guard my art. Into whatsoever houses I enter, I will do so to help the sick, keeping myself free from all wrongdoing, intentional or unintentional, tending to death or to injury, and from fornication with bond or free, man or woman. Whatsoever in the course of practice I see or hear (or outside my practice in social intercourse) that ought not to be published abroad, I will not divulge, but consider such things to be holy secrets. Now if I keep this oath and break it not, may God be my helper in my life and art, and may I be honoured among all men for all time. If I keep faith, well; but if I forswear myself may the opposite befall me."

Frank B. Berry

FRANK B. BERRY, M. D.
Assistant Secretary of Defense
(Health and Medical)

Table of Contents

Conservative Management of Ureteral Calculi: Without Use of Hazardous Instruments—*Edward Gartman* 313

Serum Gamma Globulin in the Burned Patient: With Special Reference to Septicemia—*Bernard Balikov, Curtis P. Artz, and Donald F. Solometo* 321

The Effect of Pain on Performance—*Fred B. Benjamin* 332

Psychiatric Prediction and Military Effectiveness: Part III. Factors Influencing Psychiatrists—*Albert J. Glass, Francis J. Ryan, Ardie Lubin, C. V. Ramana, and Anthony C. Tucker* 346

Use of X-Rays and Other Ionizing Radiation: The Responsibilities of the Medical Profession—*United Nations Scientific Committee on Effects of Atomic Radiation* 358

Treatment of Paraphimosis—*Richard W. Cletsoway and Evan L. Lewis* 361

Chlorpromazine Jaundice—*Roberto E. Benitez, Theodore A. Kiersch, Joseph Castagno, and Edwin M. Goyette* 365

Importance of Flexion in Cervical Traction for Radiculitis—*Benjamin L. Crue, Jr.* 374

CLINICOPATHOLOGIC CONFERENCE

U. S. Army Hospital, Frankfurt, APO 757, New York, N. Y. 381

SERVICE ARTICLES

Present-Day Military Obligations—*Daniel C. Elkin* 394

A Psychiatric Study of a Retraining Command—*Nathan Schlessinger and David Blau* 397

Experiences in Providing Salad Vegetables to American Forces in Japan—*Lyman P. Frick, Gottlieb L. Orth, Neil O. Wilson, Walter F. Malizia, and Ralph O. Anslow* 406

Dynamic Factors in Psychiatric Discharges of Midshipmen—*Dean J. Plazak* 418

CASE REPORTS

Vivax Malaria Without Primary Attack in Korean Veterans—*Richard S. Homer* 427

Tumors of the Testis in Infants—*Evan L. Lewis* 431

Cross Sensitization in Eczematous Contact Dermatitis—*William J. Wagner* 438

Ruptured Omphalocele—*Robert C. Ray* 445

DEPARTMENTS

A Message From the A. M. A. 449

Navy Surgeon General Receives French Medal of Honor 452

Officers Certified by Specialty Boards 453

BOOKS

Reviews of Recent Books 455

New Books Received 465

Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

FRANK B. BERRY, M. D.,
Assistant Secretary of Defense (Health and Medical).

MAJOR GENERAL SILAS B. HAYS,
Surgeon General, United States Army.

REAR ADMIRAL BARTHOLOMEW W. HOGAN,
Surgeon General, United States Navy.

MAJOR GENERAL DAN C. OGLE,
Surgeon General, United States Air Force.

UNITED STATES ARMED FORCES
MEDICAL JOURNAL

Volume VIII March 1957 Number 3

CONSERVATIVE MANAGEMENT OF URETERAL CALCULI

Without Use of Hazardous Instruments

EDWARD GARTMAN, *Lieutenant Colonel, MC, USAR*

A REVIEW of the literature covering the treatment of ureteral calculi disclosed that an extensive collection of reports of accidents resulting from the use of mechanical extractors and dilators has accumulated.[1-14] The published accidents, however, must represent but a fraction of the total. I personally know of 3 ureteral avulsions, 6 ureteral perforations, and 1 loss of a Johnson basket in the ureter; all of these injuries occurred in the past five years (1951-1956) at the hands of mature, well-trained endoscopists. Moving about in the armed services one frequently meets urologists who, like myself, eschew the use of these devices, but who have signally failed to publicize the fruits of their labors. For this reason the following presentation was prepared.

CASES STUDIED

In slightly more than five years I have treated 218 patients with 237 proven ureteral stones, in addition to some 40 other patients with colic and often with blood in the urine, in whom the presence or recent passage of a calculus could not be established. One hundred and twenty-one stones were found in patients at the 141st General Hospital, Kyushu, Japan, in 35 months (3.5

Presented at the James C. Kimbrough Urologic Seminar, Walter Reed Army Medical Center, Washington, D. C., 20 September 1956.

From the 141st General Hospital, Kyushu, Japan, and U. S. Army Hospital, Fort Sill, Okla.

per month), and 116 at U. S. Army Hospital, Fort Sill, Okla., in 27 months (4.3 per month).

The distribution of patients as to sex and type of stone—whether unilateral, bilateral, or recurrent—may be seen in table 1. Fourteen of the men and two of the women were Negroes; the rest were white. The disparity between sexes may be accounted for by the source of the patients (military hospitals), but the relative freedom of American Negroes from the disease has previously been documented.[5, 15]

TABLE 1. *Distribution of 218 patients by sex and by type and number of stones removed*

Sex	Number of patients	Type of stone	Number of stones
Men	200		219
	182	Unilateral	182
	9	Bilateral	18
	9	Recurrent	19
Women	18		18
	18	Unilateral	18
Total	218		237

The distribution of unilateral stones between right and left sides was about equal in the men. Seventeen men gave histories of one or more previous stones, while nine others were subsequently treated by me for recurrent stones. One of these nine had had 14 stones removed endoscopically or surgically, or had passed them spontaneously before coming to me. I managed him through three more and found a parathyroid adenoma, but some months after its removal he died of chronic renal insufficiency.

Of the 18 women, 11 had stones in the right side of the urinary tract. Eight of these 11 were pregnant and two were three months postpartum. Seven women had stones on the left side; among these one was pregnant and one was three months postpartum.

While it is not within the province of this article to discuss the causes of stone formation, certain observations can be made on the relationship of climate and hydration to the formation of stones. The climate of northwestern Kyushu is similar to that of the southern California coast, except that the former has more rain. The summers are short and mild, hot weather appearing suddenly early in July after the spring monsoons and ending with equal abruptness in mid-September. The summers at Fort Sill,

Okla., are long, intensely hot and dry, and the temperature not uncommonly attains 90°F in early April and regularly goes over 100°F after the first of June, the heat lasting until the end of September. Temperatures over 110°F are not rare. The summer of 1954 was unusually severe with more than 40 days of maximum temperatures of 100°F or more, while the summer of 1955 was uncommonly mild and wet—there were only two days with temperatures reaching 100°F.

In the three Kyushuan summers (July, August, and September of 1951, 1952, and 1953), only 42 (34.7 per cent) of a total of 121 stones were encountered; in 1954 at Fort Sill, 42 (71.2 per cent) of a total of 59 stones were seen in June through September. The 59 stones seen at Fort Sill in 1954 amounted to almost 5 per month, while there were only 44 in 1955 (3.7 per month) and 13 in the first 4 months of 1956 (3.2 per month). Prince, Scardino, and Wolan[16] presented similar evidence of the effect of a hot, dry climate. It was interesting to note that Milbert and Gersh[15] saw only 3.2 stones per month at Fort Sill in a 15-month period during World War II (June 1942 to August 1943).

SPONTANEOUS PASSAGE

The location and fate of the 237 stones have been summarized in table 2. Almost four out of five stones passed spontaneously, the largest being 0.8 cm in its greatest diameter and originally presenting in the lower third of the right ureter. Over 90 per cent

TABLE 2. *Method of removal of 237 stones in 218 patients*

Location of stone	Number of stones	Passed spontaneously	Attempted cystoscopic removal			Open operation alone
			Succeeded		Failed (operated on)	
			On first attempt	On second or later attempt		
Impacted at meatus	28	11	15	1	0	1
Below pelvic brim	141	122	15	2	0	2
Above pelvic brim	68	53	3	2	6	4
Total	237	186	33	5	6	7

of the stones passed were less than 0.5 cm long. One stone 0.3 cm in diameter was passed within two hours of the first twinge of pain; a similar-sized stone, found after hematuria was observed microscopically in a routine physical examination, was passed painlessly 105 days later, the patient experiencing two brief,

widely separated episodes of colic during this time. The majority, however, passed in from two to nine days; the mean was almost five days. No complications or accidents accompanied the spontaneous passage of stones.

CYSTOSCOPIC REMOVAL

The following criteria, listed in the order of weight attached to them, were used as indications for intervention: (1) the degree of obstruction; it was believed that incomplete obstructions producing dilatations above were more urgent than completely obstructing stones suppressing function; (2) the size of the stone; (3) its location; and (4) the frequency and severity of pain. Great reliance was placed upon intravenous urography, which was regularly employed before attempting instrumentation or operation.

In handling stones endoscopically, the following maneuvers alone were used. Stones projecting out of, or impacted in, the ureteral meatus were extracted with a cystoscopic foreign body forceps, or else meatotomy with a cystoscopic scissors and extraction were performed. No rigid or metallic instruments were used beyond visual range. For stones above the meatus, a single catheter was inserted by the stone and left indwelling for from 24 to 48 hours. The stone was then fragmented by gentle manipulation with various-sized catheters in sequence. Radiologically "soft" stones were snared with a lasso catheter. Small stones were rolled out in the eye of a catheter.

These manipulations were successful the first time in 75 per cent of the cases. This compared favorably with the best endoscopic results.[2,3,5,10,11] The largest stone removed transurethrally measured 0.7 cm in its greatest diameter, the smallest was a minute granule less than 0.1 cm in diameter. Only nine were greater than 0.5 cm in length. There were no complications or accidents. Five other stones, ranging from 0.4 to 0.9 cm in greatest diameter, were removed after two or more efforts. Two of the patients suffered attacks of pyelonephritis after unsuccessful tries, but again there were no accidents. Cystoscopic attempts (six per stone) to remove six stones ranging from 0.6 to 1.3 cm in diameter from the upper ureter resulted in failure, and all were removed by ureterolithotomy. These represented a rather high failure rate of 13.6 per cent. Some other cystoscopic failure rates are: Dourmashkin,[3] 5.3 per cent; Wishard,[1] 8.9 per cent; Middleton and Grua,[11] 3 per cent; Prentiss, Mullenix, and Whisenand,[14] 20 per cent.

The cystoscopic failures were all accompanied by one or more attacks of pyelonephritis (15 for the group). These patients suffered considerably, had prolonged hospitalizations, and, in one

instance, a ureteral perforation almost occurred. The largest stone in the group, 1.3 cm long, was pulled down to the middle of the pelvic ureter with a lasso. At this point one of its prongs became impaled in the ureteral wall, but the No. 00 silk thread tore before further damage could be done. The lasso tore frequently, invariably under tensions too low to injure the ureter—its major advantage. These six stones were handled at the 141st General Hospital. As a result of our experience with them, all stones seen since then in the upper ureter with diameters greater than 0.5 cm have been removed by open operation without further delay. Despite this change in attitude, I have done only four ureterolithotomies at Fort Sill.

SURGICAL REMOVAL

There were 13 ureterolithotomies, or 5.5 per cent of the total series. At the time of operation, the stones were located as follows: ureteral meatus (large ureterocele), 1; pelvic ureter, 3 (figs. 1 and 2); upper ureter, 9. There was only one complication. Fol-

Figure 1. Intravenous urogram showing large stone in left ureteral diverticulum in a 24-year-old white woman. Stone palpable vaginally; was removed transvesically.

lowing removal of a stone in the upper ureter on 7 January 1956, a persistent fistula developed. On 20 January the patient was cystoscoped and a millet-sized spicule, not counted as one of the 237 stones, was found in the ureteral orifice. This was removed and a No. 8 French ureteral catheter was left indwelling for 48 hours. The fistula closed promptly, and the patient returned to duty on 23 January, to be readmitted the following evening with an abscess in the fistulous tract. The abscess was evacuated and the patient discharged on 27 January. He has been well since. The origin of the spicule could not be determined, because a No. 8 French catheter had been passed up into the pelvis and down into the bladder at operation.

Figure 2. Plain plate showing large dendritic calculus in pelvic ureter of a 19-year-old postpartum white woman. Extraperitoneal ureterolithotomy resulted in uneventful convalescence.

DISCUSSION

The incidence of the spontaneous passage of ureteral stones in previously published series ranged from 6.2 per cent (Dourmashkin) to 53.7 per cent (Prentiss, Mullenix, and Whisenand), while intervention by open operation ranged from 7 per cent (Wishard) to 54.3 per cent (Kittredge and James[10]). Of the stones in my series, 78.5 per cent came out unaided, and a mere 5.5 per cent required open operation. This probably can be attributed to the fact that in the military all patients with ureteral calculi are turned over to the urologist immediately, whereas in civilian practice only the more difficult and stubborn cases are seen by the urologist. Accordingly, the present series probably represents a truer picture of the disposition of ureteral calculi than those hitherto published.

SUMMARY AND CONCLUSIONS

In a series of 237 ureteral calculi in 218 patients, 186 stones passed spontaneously without accidents or complications, 38 were removed cystoscopically (33 on the first attempt, 5 on a second or later attempt), and 13 were removed by ureterolithotomy (6 after cystoscopic failure and 7 by operation alone). Two of the patients whose stones required more than one cystoscopic attempt had attacks of pyelonephritis following unsuccessful tries, but there were no accidents. Those patients in whom cystoscopic removal failed suffered 15 attacks of pyelonephritis, and there was one near perforation of the ureter. One patient, a chronic stone former, died of renal insufficiency some months after the removal of a parathyroid adenoma. There were no other deaths.

This series demonstrates that ureteral stones can be adequately and safely handled without the use of hazardous instruments.

REFERENCES

1. Wishard, W. N., Jr.: Stones in lower third of ureter with report of instance of incarcerated basket. *J. Urol.* 50: 775-783, Dec. 1943.

2. Councill, W. A.: Treatment of ureteral calculi; report of 504 cases in which Councill stone extractor and dilator was used. *J. Urol.* 53: 534-538, Apr. 1945.

3. Dourmashkin, R. L.: Cystoscopic treatment of stones in ureter with special reference to large calculi; based on study of 1,550 cases. *J. Urol.* 54: 245-283, Sept. 1945.

4. Herman, L.; Greene, L. B.; and Hayllar, B. L.: Ureteral injuries. *J. Urol.* 56: 688-696, Dec. 1946.

5. Ellik, M.: Stones in ureter; their extraction by looped catheter. *Tr. West. Sect., Am. Urol. A.* 13: 45-50, 1946; also *J. Urol.* 57: 473-478, Mar. 1947.

6. Pate, V. A., Jr.: Lumbar ureterolithotomy. *J. Urol.* 63: 613-617, Apr. 1950.

7. Taylor, W. N.: Lumbar ureterolithotomy. *J. Urol.* 69: 77-81, Jan. 1953.

8. Valenta, J. C., and Chenoweth, C. V.: Foreign bodies in ureter; complication from use of electrodes for ureteral meatotomy. *J. Urol.* 69: 492-495, Apr. 1953.

9. Iwano, J. H., and Bunts, R. C.: Complications arising from transurethral manipulation of ureteral calculi. *J. Urol.* 70: 708-715, Nov. 1953.

10. Kittredge, W. E., and James, D.: Management of ureteral calculi. *J. Urol.* 72: 342-345, Sept. 1954.

11. Middleton, R. P., and Grua, O. E.: Review of one year's experience with Johnson extractor in management of ureteral and renal calculi. *Tr. West. Sect. Am. Urol. A.* 18: 86-100, 1951; also *J. Urol.* 68: 125-136, July 1952.

12. Negley, T. C., and Ellik, M.: Discussion in reference 11.

13. Nation, E. F.: Facilitation of passage and extraction of ureteral calculi. *Tr. West. Sect. Am. Urol. A.* 19: 133-137, 1952.

14. Prentiss, R. J.; Mullenix, R. B.; and Whisenand, J. M.: Management of ureteral stone; guide for physicians in general practice. *California Med.* 77: 7-11, July 1952.

15. Milbert, A. H., and Gersh, I.: Urolithiasis in soldier. *J. Urol.* 53: 440-446, Mar. 1945.

16. Prince, C. L.; Scardino, P. L.; and Wolan, C. T.: Effect of temperature, humidity and dehydration on formation of renal calculi. *J. Urol.* 75: 209-215, Feb. 1956.

ARE SAINTS WELL ADJUSTED PEOPLE?

"The easy way to relieve stress is to yoke mental science and modern techniques of persuasion to the task of making everyone well-adjusted to everyone else. This is not only tempting, it is in a measure useful and indeed necessary. For our growing organisation demands ever more conformity, ever more mutually adjusted specialism, ever more acceptance to make it work at all. There seems ever less time for doubt and for dissent. Yet both Christian and scientific insights warn us that along that road lies mortal danger not only for the individual but for society also.

"For saints, artists, creative thinkers, and above all martyrs are seldom well-adjusted people; and no civilisation can do without them, least of all ours which changes faster than any has before. These are they who incubate tomorrow's orthodoxies through their heretic phase—for all orthodoxies were heresies when they were born. These are the deviants, from among whom spiritual evolution will find the material for her next big adaptation. In every age so far enough have escaped martyrdom to fertilise the next. It would be ironic, if we alone were efficient enough to make ourselves spiritually barren."

—SIR GEOFFREY VICKERS, V. C., M. A.
in *Lancet*, p. 524, March 12, 1955

SERUM GAMMA GLOBULIN IN THE BURNED PATIENT

With Special Reference to Septicemia

BERNARD BALIKOV, *Captain, MSC, USA*
CURTIS P. ARTZ, *Lieutenant Colonel, MC, USA*
DONALD F. SOLOMETO, *Specialist Third Class, USA*

THE PRESSING problem of septicemia in the burned patient has been re-emphasized in a recent report by Liedberg and associates.[1] Because many antibodies are concentrated in the serum gamma globulin (GG),[2,3] it was believed that a study of changes in this protein fraction might aid in understanding some of the biochemical responses of a burned patient to septicemia. As a burn study center, this unit had material readily available. The following is a report on 19 patients who had burns ranging from minimal to lethal. Of these, 7 had septicemia, 11 did not, and in 1 septicemia was doubtful.

MATERIALS AND METHODS

It was possible for many of the patients studied to be admitted to this unit within 24 hours after their injury because of an efficient air evacuation procedure set up by this organization. Only four patients were admitted 10 or more days postburn. All data were collected within a period of four months. The importance of these factors is that they allowed for essentially similar therapy for all patients studied. Since administration of fluids to the burned patient is intensive for at least several days following the trauma, differences in therapy could conceivably vary the results of a study, particularly on blood constituents. The therapeutic regimen followed on these patients was essentially that given by Reiss and associates.[4]

GG was assayed by a recently described method[5] which consists essentially of salt-fractionation by the method of Wolfson and associates[6] followed by a modification of the tyrosine color

---

From Surgical Research Unit, Brooke Army Medical Center, Fort Sam Houston, Tex. Capt. Balikov is now assigned to Walter Reed Army Institute of Research, Washington, D. C.

reaction of Greenberg[7] applied to the isolated protein. Recoveries of GG added to serum or from artificial mixtures of albumin and globulin averaged about 85 per cent.[6] The precision of this method (twice the standard deviation) is ±0.14 g per 100 ml of serum.[5]

Total protein (TP) was estimated by a procedure which was also based on the tyrosine color reaction of Greenberg. This method has been modified for adaptation to the Coleman Jr. spectrophotometer by adjusting volumes of sample and reagents such that most readings fall in the center of the spectrophotometer scale when read at a wave-length setting of 670 millimicrons. Thus, 0.5 ml of serum is made up to 20 ml with isotonic saline. One ml of this solution is used for color development by addition of 22 ml of water, exactly 1 ml of 5 normal sodium hydroxide, and 1 ml of phenol reagent. One milliliter of a standard containing 0.1 mg of tyrosine in 0.1 normal hydrochloric acid is treated precisely as is the saline-serum solution. The blank which is treated in the same fashion consists of 1 ml of isotonic saline.

All GG and TP analyses were done on serum from blood samples drawn after an overnight fast.

RESULTS

Table 1 summarizes our results. The burn equivalence used is adapted from Bull and Squire,[8] who weight second-degree involvement as equivalent to one fourth the severity of third-degree involvement. This serves to define the over-all seriousness of an injury in which there is both second- and third-degree burns.

The GG values in table 1 are presented as a scattergraph in figure 1 to demonstrate the initial drop to subnormal levels which is characteristically followed by a rise with increasing time postburn. Although the serum GG may be normal on day 0 (0.7 to 1.7 g per 100 ml of serum),[5] sometime between day 0 and day 10 the level will tend to drop below normal, at least for burns of a burn equivalence greater than 5. This level is taken as the cut-off point since a patient with a burn equivalence of 4 did not show this phenomenon, although one with a burn equivalence of 6 did.

The one low GG value in the lower right-hand corner of figure 1 was obtained on the 32d postburn day for that patient. The reason for such a low level at that late date is not apparent. This patient did not have septicemia and was doing well at the time the blood was drawn. Seven days prior to this sampling, a GG level of 1.4 g per 100 ml of serum was found, and some 30 days later a value of 1.4 was again observed. Unfortunately, no

TABLE 1. *Serum gamma globulin levels and gamma globulin to total protein ratios related to extent of burn, days postburn, and septicemia*

Burn equivalence 3°+ 1/4 2°	Gamma globulin (g per 100 ml of serum)					Gamma globulin/total protein				
	Days postburn									
	0-7	8-14	15-21	22-28	29-35	0-7	8-14	15-21	22-28	29-35
4	1.4	1.4				0.19	0.18			
6	0.5*	1.1		1.3		0.09	0.17		0.20	
	0.5					0.09				
8	0.7	1.0		1.3		0.12	0.17		0.21	
	0.6					0.12				
11	0.7		1.6	1.6		0.12		0.29	0.26	
12	1.0			1.6	1.8	0.19			0.22	0.25
	0.7					0.14				
14				1.4	0.2				0.24	0.03
19		*0.7***	1.3	1.4			*0.13*	0.22	0.18	
		0.9					0.16			
20			2.4	1.9	1.6			0.34	0.27	0.25
22		0.9		1.2	1.4		0.17		0.18	0.22
24	0.3	*0.7*				*0.08*	*0.17*			
	1.2					0.24				
24	*0.03*	*0.2*				*0.01*	*0.05*			
25		1.0	1.6	1.0	1.2		0.26	0.26	0.16	0.21
			1.6					0.25		
27			1.1	1.6	1.9			0.27	0.33	0.36
31		1.2		1.4	*1.5*		0.25		0.21	*0.23*
				1.6					*0.29*	
33	0.6	1.3***	1.4	1.1	0.9	0.12	0.24	0.27	0.17	0.16
	0.4		1.2	1.1		0.08		0.21	0.18	
36		0.9		0.8	1.6		*0.21*		0.19	0.24
36	0.5					*0.14*				
45	0.6					0.14				
	1.2					0.30				
54	*0.5*	*0.7*				*0.13*	*0.14*			

*Two results in one period indicate analyses on two different days within this period, the upper value referring to the earlier day.

**Italicized results were obtained on samples drawn while a patient had septicemia.

***Dash lines are under results obtained on samples drawn from a patient with questionable septicemia.

assays were taken shortly after obtaining the remarkably low value, and it remains an enigma.

The ratio GG/TP (fig. 2) shows precisely the same relationship with days postburn as does GG alone (fig. 1).

On glancing at the GG values in table 1 for the period 0 to 7 days postburn, it appeared that levels were particularly low on patients with septicemia. However, since all values tend to be

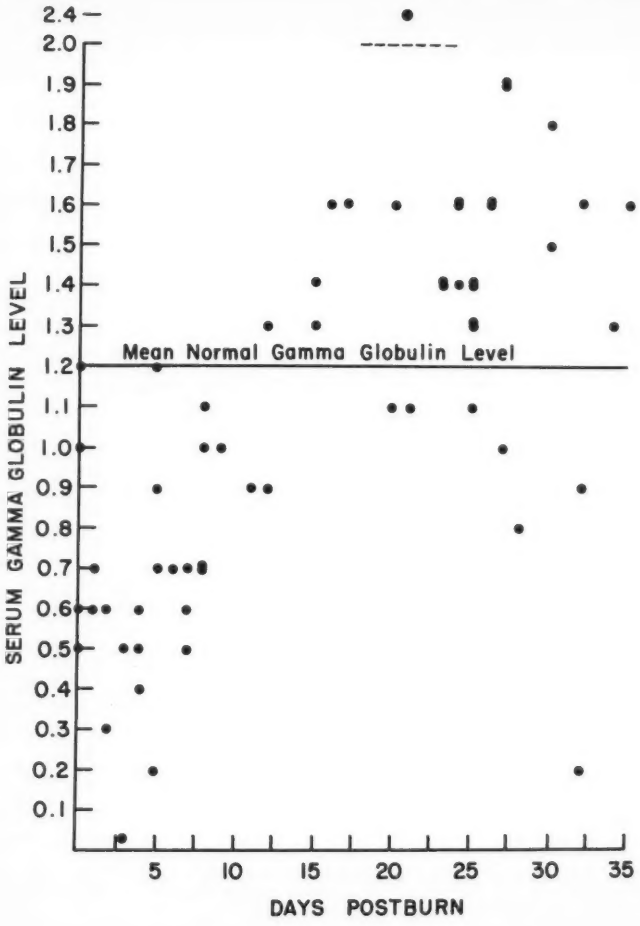


Figure 1. The change of serum gamma globulin levels with days postburn.

low during this period, a statistical analysis was employed to determine the confidence one could place in this observation. Values obtained during the first 10 postburn days were analyzed according to the method described by Mainland,[9] and the results are shown in table 2. The P value indicates a significant difference between the two groups at the 5 per cent level and leads to the conclusion that during the first 10 postburn days, although low serum GG levels are to be expected, these values will be still further depressed if septicemia is present.

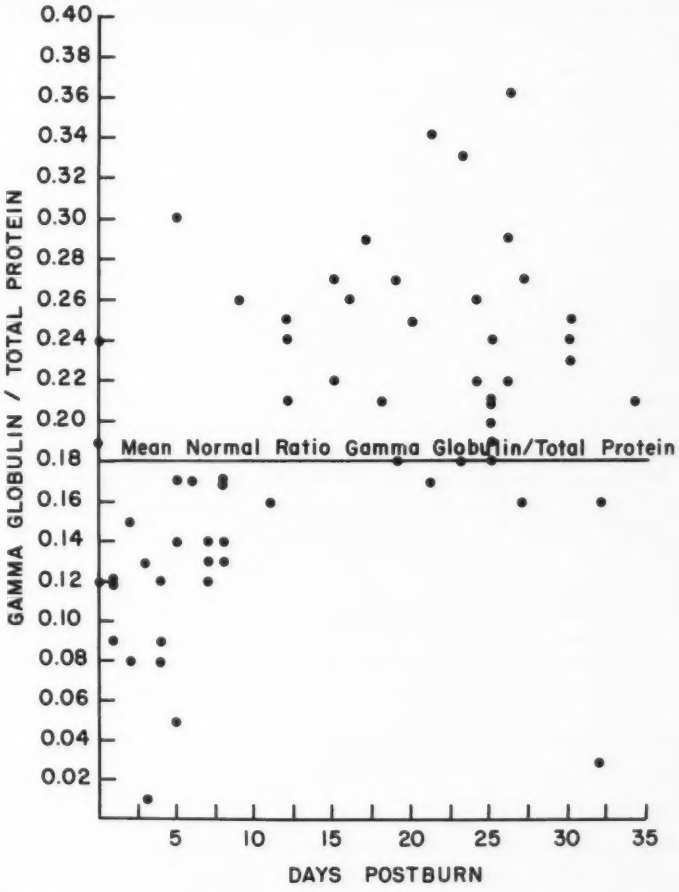


Figure 2. The change of the ratio (gamma globulin/total protein) with days postburn.

An analysis of the GG/TP ratios identical to the above analysis of GG levels reveals the following:

t=1.54
P=between 0.1 and 0.2

This P value does not indicate a statistically significant difference between the two groups. It does, however, point to a likely tendency for ratios which, although low during the first 10 postburn days, may be still lower in the presence of septicemia.

416757 O - 57 - 2

TABLE 2. *Effect of septicemia on serum gamma globulin levels*

	Septicemic	Nonsepticemic
Number of values	9	16
Mean GG level	0.5	0.9
Standard deviation	±0.34	±0.38
t	2.17	
P	0.02-0.05	

The work of Prendergast, Fenichel, and Daly[10] led us to seek a relationship between the burn equivalence as a measure of the seriousness of a burn, and the serum GG level. The days postburn were divided into 7-day periods (table 1) and the mean GG for an equivalence of 20 and below was compared with the mean for equivalences of over 20, again by use of the *t* test. Contrary to the conclusions drawn by Prendergast, Fenichel, and Daly, it can be seen (table 3) that for every period except the one from 29 to 35 days, the mean GG level for the low equivalence burns is actually greater than for the high equivalence burns.

TABLE 3. *Correlation of serum gamma globulin and gamma globulin to total protein ratios with extent of burn*

Days postburn	0-7		8-14		15-21		22-28		29-35	
Burn equivalence	20 and under	Over 20	20 and under	Over 20	20 and under	Over 20	20 and under	Over 20	20 and under	Over 20
Mean GG level	0.8	0.6	1.1	0.9	1.8	1.3	1.5	1.2	1.2	1.3
t	0.90		1.18		1.38		2.09		0.73	
P	0.3-0.4		0.2-0.3		0.2-0.3		0.05-0.1		0.4-0.5	
Mean GG/TP ratio	0.14	0.14	0.16	0.19	0.28	0.25	0.23	0.22	0.18	0.24
t	0		1.35		0.82		0.41		1.25	
P	-		0.2-0.3		0.4-0.5		0.6-0.7		0.2-0.3	

The GG/TP ratios show no trends whatever when correlated with the seriousness of the burn, during any postburn period (table 3).

DISCUSSION

The reason for the fall in serum GG levels during the first several days postburn is not known. Dilution subsequent to fluid therapy probably plays a role, but this would not explain the drop in the GG/TP ratio. Gjessing and Chanutin[11] noted a similar drop in the GG levels of burned rats and stated that this is also true in the dog. Prendergast, Fenichel, and Daly, although principally interested in GG levels some 15 to 20 days postburn, have recorded values earlier as well (using an electrophoretic procedure). A study of either their table or their graphs indicates precisely the trend noted above, namely, a drop in the serum GG sometime between day 0 and about day 10, followed by a rise to normal or above.

It is of interest that the GG/TP ratio also falls during this early postburn period. Since it is well known that the plasma TP concentration is depressed at this time, it must mean either that less of the other protein fractions are lost or that some of these other protein fractions are more efficiently replaced than GG. If the answer is that less "other protein" is lost, it is not likely to be a leakage phenomenon since the GG molecule is among the largest of the protein fractions and so would be less rather than more likely to leak out of the vascular system. This differential loss, therefore, would be more readily explained on the basis of a more rapid metabolism of GG.

However, it is quite possible that the mechanism does not involve loss as much as it does replacement. Replacement can be accomplished either by infusion of protein solutions or by some in vivo metabolic process. Gjessing and Chanutin, in their work with burned rats, found a percentage fall in the plasma albumin and GG and a percentage rise in the alpha- and beta-globulin fractions (with reference to TP). These rats received no transfusions. This would increase the likelihood of a replacement phenomenon of the relatively more concentrated fractions being the result of some in vivo metabolic process rather than the result of therapeutic infusions. As an in vivo phenomenon, the cause can be either inadequate formation or inadequate distribution. The latter possibility is based on a preliminary report by Francis, Hawkins, and Wormall,[12] who present evidence for the presence of an extravascular antibody in the rabbit. Also, Miller and associates[13,14] report that in rats GG is formed almost exclusively in extrahepatic tissue. It is thus possible that, even though GG is formed, it does not find its way into the blood

stream. To summarize, the differential depression of the serum GG in the early postburn period is most likely due to one or more of three factors: (1) a high rate of removal by some metabolic process; (2) a low rate of formation; or (3) inadequate movement of GG from extravascular to intravascular spaces.

The additional drop in GG levels seen in the presence of septicemia occurring during the first 10 days postburn is surprising, because normally one expects to find an increase in the presence of an infectious disease. Since sodium is retained in such cases and since it is common practice to intensify administration of fluids to burned patients with septicemia, dilution may again be a significant factor. However, simple dilution does not explain the tendency for the GG/TP ratio to fall. It is possible that the initial low GG levels seen on all burned patients are related (in addition to a dilution phenomenon) to a stimulation for production of plasma GG to which the organism is already unable to respond. Thus, the additional stimulus of an infectious condition may be incapable of evoking an increased response. In the usual situation, even though the complex formed by an antigen-antibody reaction in vivo may remove some circulating GG, apparently the organism is stimulated to a further production of antibody resulting in a net increase of plasma GG. Since the organism is incapable of such an increased production in the early stages of a burn, the net effect of removing antibody GG by formation of an antigen-antibody complex is to lower the GG level.

From figure 1 it can be seen that the rise in GG with time postburn is characteristic not only of patients who recuperate, but also of those whose condition deteriorates and who eventually die. In this latter group are three patients who lived longer than 10 days (burn equivalences of 19, 27, and 33 of table 1). Although patient 13 did not have a GG assay until his 19th postburn day, there seems no reason to believe his earlier GG levels would not have fallen into the usual low range. With only three patients in this category, one cannot draw conclusions with a great deal of assurance. However, it would appear that, whatever the nature of the antagonism to the production of plasma GG in the immediate postburn period, it is the result of the burn insult per se. Thus, despite other complications, as the organism recovers from this shock it again becomes capable of responding to the demand for plasma GG.

The above considerations may make it worthwhile for clinicians to consider the use of GG preparations as part of their therapeutic program during the immediate postburn period.

As pointed out under "Results," we have been unable to confirm the observation by Prendergast, Fenichel, and Daly that

there is a relationship between the increase in GG level and the severity of the burn. Contrariwise, we find a tendency for lower GG levels with increasing severity of burn (table 3). It is possible that this discrepancy is the result of differences in analytical methods. Prendergast, Fenichel, and Daly used an electrophoretic method, whereas we used a salt-fractionation method. The principal difference in these methods is that we may be measuring approximately 15 per cent non-GG protein as compared with electrophoretic separations. However, this "contaminant" is not dependent upon albumin concentration and so is presumably dependent only upon globulin changes.[6] Since Prendergast, Fenichel, and Daly found that other globulin fractions also increase with the GG (though not as markedly), it is believed that methodologic differences are not likely to contribute greatly to differences in findings. Nonetheless, one should not dismiss this possibility since, in the special case of a burned individual, these methodologic differences may be exaggerated.

It is also possible that the discrepancy in our findings is due, not to methodologic differences, but to differences in therapy. These workers[10] stress the use of repeated whole blood transfusions, whereas our regimen stresses administration of plasma expanders and large quantities of electrolyte solutions in addition to blood.[4] This difference is difficult to evaluate because of the large role usually played by clinical judgment in deciding on therapy for any particular patient. In general, the total proteins reported by Prendergast, Fenichel, and Daly for their serious burns are considerably higher than ours, so there is a good possibility that their therapeutic regimen does favor protein replacement more than does ours, and that this in turn contributes to the lack of agreement on relating GG levels to the severity of the burn.

Another variable is the classification of a burn with regard to seriousness of injury. The burn equivalence previously mentioned is an attempt to make this observation more objective. However, this system was used only by our group so that we cannot be sure that a burn called very serious by one group would be similarly listed by another. It was found that differences in handling data did not contribute to differences in findings. They analyzed their data by observation. We grouped their patients as four with "severe" and four with "less severe" burns (according to their own descriptive classification) and divided the GG data accordingly. The levels in each group were averaged and subjected to the t test. Differences between the groups were statistically significant (P value of between 0.02 and 0.05). To summarize, it would appear that differences between our results and the observations of Prendergast, Fenichel, and Daly are

probably due to differences in therapy, with contributions to this discrepancy from differences in method and from lack of standardization in classifying the severity of the injury.

It has been pointed out that there is a statistical difference between the GG levels of patients with, and those without, septicemia during the first 10 postburn days. One may ask if this drop in GG level is a sensitive index of septicemia. The mean for the nonsepticemic group is 0.9 g per 100 ml of serum with a range (twice the standard deviation) of from 0.1 to 1.7. Thus, a value must be 0.1 or less to be a statistically significant indication of septicemia. However, the mean for the septicemic group is 0.5 with a range of from 0 to 1.2, so that there is a considerable overlap of values. Therefore, during the first 10 postburn days, a GG level of 0.1 or less is most likely related to septicemia, but levels between 0.1 and 0.5 must be considered doubtful. Since very few values on patients with septicemia are 0.1 or less (table 1), this test cannot be considered a sensitive index of septicemia.

SUMMARY

During the first 10 postburn days, there is a tendency for serum GG levels to drop below normal in burns classified as having a burn equivalence greater than 5.

If septicemia is present during the first 10 postburn days, the serum GG level will tend to be exceptionally low. Values as low as 0.1 g per 100 ml of serum or less are usually associated with septicemia. However, a low GG concentration is not a sensitive index of septicemia.

There is a tendency for the ratio GG/TP to be low during the first 10 postburn days, particularly in the presence of septicemia. The significance of this observation is discussed.

After the first 10 postburn days, the serum GG concentration will increase regardless of whether the condition of the patient improves or deteriorates.

No relation can be found between the seriousness of a burn as determined by the burn equivalence and either GG values or GG/TP ratios at any stage of a burned patient's recovery. The reasons for the disagreement between this finding and the reports of other workers are discussed.

REFERENCES

1. Liedberg, N. C.-F.; Reiss, E.; and Artz, C. P.: Infection in burns; septicemia, common cause of death. *Surg. Gynec. & Obst.* 99: 151-158, Aug. 1954.

2. Enders, J. F.: Concentrations of certain antibodies in globulin fractions derived from human blood plasma. *J. Clin. Invest.* 23: 510-530, July 1944.

3. Tiselius, A., and Kabat, E. A.: Electrophoretic study of immune sera and purified antibody preparations. *J. Exper. Med.* 69: 119-131, Jan. 1939.

4. Reiss, E.; Stirman, J. A.; Artz, C. P.; Davis, J. H.; and Amspacher, W. H.: Fluid and electrolyte balance in burns. *J. A. M. A.* 152: 1309-1313, Aug. 1, 1953.

5. Balikov, B., and Solometo, D. F.: Gamma globulin levels in normal human serum. To be published in *Clin. Chim. Acta.*

6. Wolfson, W. Q.; Cohn, C.; Calvary, E.; and Ichiba, F.: Studies in serum proteins; rapid procedure for estimation of total protein, true albumin, total globulin, alpha globulin, beta globulin, and gamma globulin in 1.0 ml. of serum. *Am. J. Clin. Path.* 18: 723-730, Sept. 1948.

7. Greenberg, D. M.: Colorimetric determination of serum proteins. *J. Biol. Chem.* 82: 545-550, May 1929. Cited in Hawk, P. B.; Bergeim, O.; Oser, B. L.; and Cole, A. G.: *Practical Physiological Chemistry.* 11th edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1937. pp. 455-456.

8. Bull, J. P., and Squire, J. R.: Study of mortality in burns unit; standards for evaluation of alternative methods of treatment. *Ann. Surg.* 130: 160-172, Aug. 1949.

9. Mainland, D.: *Elementary Medical Statistics: The Principles of Quantitative Medicine.* W. B. Saunders Co., Philadelphia, Pa., 1952. p. 156.

10. Prendergast, J. J.; Fenichel, R. L.; and Daly, B. M.: Albumin and globulin changes in burns as demonstrated by electrophoresis. *A. M. A. Arch. Surg.* 64: 733-740, June 1952.

11. Gjessing, E. C., and Chanutin, A.: Electrophoretic study of plasma and plasma fractions of normal and injured rats. *J. Biol. Chem.* 169: 657-665, Aug. 1947.

12. Francis, G. E.; Hawkins, J. D.; and Wormall, A.: Extravascular antibody. Proc. Biochem. Soc., London, 334th meeting, 12 Nov. 1954 (issued with *Biochem. J.*) 59: vii, Jan. 1955.

13. Miller, L. L., and Bale, W. F.: Synthesis of all plasma protein fractions except gamma globulins by liver; use of zone electrophoresis and lysine-ϵ-C14 to define plasma proteins synthesized by isolated perfused liver. *J. Exper. Med.* 99: 125-132, Feb. 1954.

14. Miller, L. L.; Bly, C. G.; and Bale, W. F.: Plasma and tissue proteins produced by non-hepatic rat organs as studied with lysine-ϵ-C14; gamma globulins chief plasma protein fraction produced by non-hepatic tissues. *J. Exper. Med.* 99: 133-153, Feb. 1954.

"'The true aim of the teacher should be to impart an appreciation of method rather than a knowledge of facts,' for method is remembered when facts have been forgotten."

—G. W. PICKERING, M. D.
in *British Medical Journal*
p. 116, July 21, 1956

THE EFFECT OF PAIN ON PERFORMANCE

FRED B. BENJAMIN, *D. M. D., Ph. D.*

PAIN SENSATION is not confined to the sickbed, and frequently people in all stages of life have to do mental and physical work in the presence of pain. This raises the problem of the extent to which pain might affect their performance. In the literature it has been shown that pain produces various autonomic responses[1-4] and that these might affect performance.[4-7] Pain is also a stressor agent, and stress has been shown to affect performance.[8-10] There is an emotional component in pain,[1,4,11,12] and emotion can affect performance.[5,13-16] None of this work is primarily concerned with the effect of pain on performance. Conclusions might be drawn by inference but, to the author's knowledge, no direct work has been done on this specific problem.

In this study performance has been measured by a variety of tests, largely taken from the psychologic literature. However, the psychologist uses these tests to learn something of the subject's abilities, his scopes, and his limitations. For the purpose of this investigation, the subject's level of performance is unimportant and we deal only with the change of performance in the presence of pain.

METHODS

In these tests each subject serves as his own control and the results are analyzed as a paired comparison. The scheme of tests is given in table 1. An attempt was made to eliminate any possible influence of environmental conditions, such as environmental temperature, noise level, the time of day, and differences in the amount or type of instructions, by always testing simultaneously one subject with pain and one without pain. We did not attempt to train the subjects prior to the test in order to get a plateau of performance, partly because these plateaus, according to Lazarus, Deese, and Osler,[9] do not appear to be too reliable, and partly because a true plateau at maximal performance would not permit observation of increased performance. Our tests were designed to detect changes in the rate of performance,

---

From the Aviation Medical Acceleration Laboratory, U. S. Naval Air Development Center, Johnsville, Pa., and the University of Pennsylvania, Philadelphia, Pa.

accuracy of performance (number of mistakes), memory, time perception, muscular co-ordination, reaction time, and work performance. The 26 subjects were personnel of this laboratory and medical, dental, and graduate students, all of them males between the ages of 19 and 42 years.

TABLE 1. *Arrangement of tests*

Test	Subject A	Subject B
First	Pain	Control
	Control	Pain
Second	Control	Pain
	Pain	Control

Methods of Producing Pain

Pain was produced in several ways:

1. *Headgear.* A Styrofoam frame was placed around the head slightly above eye level. Inside this frame was a soft plastic tube filled with water. The water pressure could be raised by means of a leveling bottle to 4.5 feet of water. This produced a mild pressure pain of about 1 dol or less, while during the control test the headgear was applied without pressure.

2. *Pressure cuff* (Lewis[11]). The blood flow of the upper arm was obstructed by means of a pressure cuff inflated to 180-200 mm Hg. After two minutes a deep, aching pain of 2-3 dols was obtained which increased slightly during the next few minutes. During the control period the cuff was in position but not inflated.

3. *Ice Water* (Hines and Brown[17]). The hand was immersed in ice water which was being stirred by means of an electric mixer. This produced marked pain which increased up to about 4 dols within about 45 seconds, and then stayed at that level for another 45 seconds. As a control experiment, the same hand was held for the same length of time in water at 21°-27°C.

Mental Performance Tests

The selection of tests was limited by (1) the time factor, since generally we did not want to produce pain for more than 90 seconds; and (2) tests that could be evaluated numerically. The following tests were used:

1. *Crossword puzzle.* Three groups of three numbers were given, and the subject was asked to replace each number by a letter so that the three horizontal lines made complete words (fig. 1A).

2. *Number or letter groups.* In this test four groups of numbers or letters were given, of which three had a common pattern. The subject had to cross out the one that did not fall in line (fig. 1B).

3. *Number or letter sequence.* In this test each group had a periodically repeated pattern, and the subject had to fill in the letter or number that would follow logically if the pattern were maintained (fig. 1C).

4. *Code substitution.* Three lines were given, and the fourth one had to be filled in. The first line consisted of the alphabet in order. In the second line numbers were given corresponding to each letter. The third line gave an arbitrary combination of letters and the corresponding numbers had to be filled in from the code given in the upper two lines (fig. 1D).

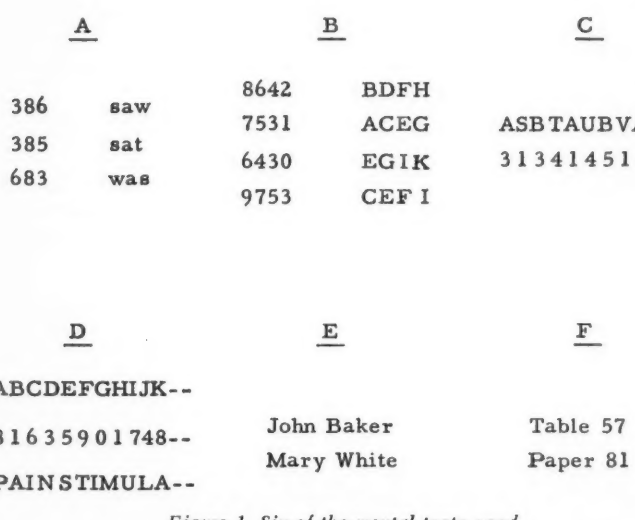


Figure 1. Six of the mental tests used.

5. *Crossing "E".* A page of printed matter was given, and all E's had to be crossed out.

Tests 1 through 5 were evaluated in two ways: (1) The number of problems attacked within the given time period was totaled, and (2) the number of mistakes was counted.

Tests Involving Memory

The second group of tests involving memory was as follows:

1. *Repeating digits.* Numbers were given, increasing from 4 to 9 digits, which the subject had to write down after a short interval.

2. *Double names.* Four double names were given, and then only the surnames were repeated in a different order, while the subject had to write down the first names (fig. 1E).

3. *Object-number.* An object was given with a number, and then the object only was repeated in a different order, while the subject had to write down the corresponding number (fig. 1F).

Time Perception Tests

In a third group of experiments time perception was tested:

1. *Free estimate.* The subject had to estimate an interval of one minute, and the actual time was recorded.

2. *Tapping.* The subject had to tap out 60 seconds on a counter, and the actual time was again recorded.[18]

Muscular Co-ordination Tests

The fourth group of tests involving muscular co-ordination was as follows:

1. *Passing ball.* A small rubber ball was passed through a 1-foot long tube, which had a slight elastic contraction at the end, so that the ball was stopped but could be pressed out easily. The number of passes per 90 seconds was determined.

2. *Punchboard.* A plastic board had three holes arranged as a unilateral triangle with a side length of 4 inches. A metal stylus fitted the holes and a shoulder stopped the punch at a depth of 3/16 inch. The number of punches per 90 seconds was counted.

3. *Rotary pursuit device.* The subject had to follow with a stylus an irregular line on a rotating kymograph. The mistakes were automatically recorded on an Esterline-Angus ammeter.

Reaction Time Tests

Reaction time was tested two ways:

1. *Simple reaction time.* A 360-millisecond time clock was arranged with two interruption switches. The operator started the clock. The subject, when seeing the hand of the clock moving, stopped it by pressing his switch.

2. *Choice reaction time.* The same arrangement as in simple reaction time was used. However, this time the subject was told to respond only to one of two sounds of slightly different frequencies. The reaction time and the number of false reactions were recorded.

Reflex Activity

Patellar reflex was determined by having a percussion hammer mounted as a pendulum and moving through a fixed arc hit the

tendon with controlled force. The movement was registered by fixing a string to the heel, which was then converted into vertical movement and registered on a kymograph.

Skin flare. The threshold of skin flare was determined with an electrically heated probe.[6] The meter reading of the first skin flare reaction was recorded.

Work Performance, Respiratory Function, and Pulse Rate

Finally, the effect of pain on rate of performance and mechanical efficiency on a stationary ergometer bicycle was determined. Respiratory measurements were made with a Hutchinson respirometer. For the oxygen analysis a Beckman model O oxygen analyzer was used. Work was determined as revolutions per 90-second period on the ergometer bicycle (Kelso 19). Data were collected during a 90-second pre-exercise period for respiratory rate, respiratory minute volume, oxygen concentration of expired air, and pulse rate. Recordings were continued during the 90 seconds of exercise. The postexercise period started 30 seconds after the end of exercise and lasted for 90 seconds. Pulse rate was determined 30, 90, and 150 seconds after the end of exercise, and all respiratory data were collected as above. Pain was produced only during the exercise period, while in the control runs the physical conditions were the same but the painful stimulus was omitted.

RESULTS

Table 2 gives the results of the first five tests on rate of mental performance. Part of the values are given as the number of problems solved in a given time period and part of them as the time needed to solve a given number of problems. In all tests there is a tendency for the rate of performance to be lower in the presence of pain, but this difference is not significant. Even if all test scores are combined there is no significant difference between the pain and no-pain conditions at the 5 per cent level of confidence.

Table 3 gives the combined results for all tests on accuracy of performance, *i. e.*, number of mistakes. We can divide this table into two groups of tests. In the first six tests the intensity of pain is directly related to the degree of interference, while in the last three tests even a mild pain causes a significant decrease in performance. All of the first six tests probably involve more of a mental effort than the simple crossing out of "E" of the last group. Higher and lower mental tasks are used in the same sense as intelligence tests are used to determine mental development in children. It is believed that in these higher mental tasks the subject concentrates so much on the problem that he ignores a mild pain, and interference appears only when the pain is of such

TABLE 2

THE EFFECT OF PAIN ON THE SPEED OF MENTAL PERFORMANCE (24 subjects)

	No. Tests	Type of Pain	Time (sec)	Control	Pain	s.e.d.	t	p
Number and letter groups	36	Ice water	90	5.4	5.0	0.38	1.05	>0.1
Number and letter sequence	36	Ice water	90	4.6	4.3	0.29	1.03	>0.1
Crossword puzzle	24	Press. cuff		95.5*	104.3*	6.20	1.42	>0.1
Code substitution	36	Ice water	90	49.3	47.5	1.76	1.02	>0.1
Code substitution	32	Press. cuff	180	92.2	89.6	1.40	1.85	0.1
Code substitution	32	Headgear	180	92.2	91.7	0.90	0.56	>0.1
Crossing out "E"	40	Ice water	90	15.9	13.2	1.31	2.03	0.1
Crossing out "E"	32	Press. cuff		303.9*	318.5*	9.20	1.58	>0.1
Crossing out "E"	32	Headgear		303.9*	315.4*	6.90	1.67	>0.1

The numbers in the control and pain columns refer to the number of problems solved, except those marked, which give the time used to solve a given number of problems. s.e.d. = standard error of the difference.

TABLE 3

THE EFFECT OF PAIN ON THE ACCURACY OF MENTAL PERFORMANCE (24 subjects)

	No. Tests	Type of Pain	Time (sec)	Pain	control	s.e.d.	t	p
Number and letter groups	36	Ice water	90	1.72*	1.1*	0.21	2.10	0.01
Crossword puzzle	24	Press. cuff		5.1	2.1	1.57	1.10	0.10
Number and letter sequence	36	Ice water	90	1.0	0.4	0.20	2.50	0.01
Code substitution	36	Ice water	90	0.9	0.3	0.21	2.86	0.01
Code substitution	32	Press. cuff	180	1.3	0.5	0.38	2.10	0.05
Code substitution	32	Headgear	180	1.0	0.5	0.27	1.85	0.10
Crossing out "E"	40	Ice water	90	7.8	3.8	1.28	3.12	0.01
Crossing out "E"	32	Press. cuff		21.3	11.7	3.17	3.03	0.01
Crossing out "E"	32	Headgear		20.8	11.7	2.88	3.16	0.01

*Pain and control values refer to number of mistakes. s.e.d. = standard error of the difference.

intensity that it cannot be ignored. However, if not much mental effort is required, then even a mild pain causes sufficient distraction to affect performance.

Table 4 gives the effect of pain on memory tests. No significant effect of pain was observed. In these tests pain was applied during the period of retention and during the recall period. Therefore, the data indicate that neither of these two components of memory are affected by pain.

TABLE 4

THE EFFECT OF PAIN FROM ICE WATER ON MEMORY

Type of Tests	No. Subjects	No. Tests	Pain	Control	s.e.d.	p
Repeating digits (4-9)	15	25	5.88*	5.04*	0.73	> 0.10
Double Names	12	14	1.89	1.75	0.24	> 0.10
Object-Number	12	12	1.84	1.85	0.22	> 0.10

*Pain and control values refer to number of mistakes. s.e.d. = standard error of the difference.

When time was determined by tapping out 60 seconds, no difference between pain and control was found. When the subject was asked to estimate one minute, there was a significant increase with pain due to cold. This is considered an indication of overcompensation for the apparently slow passage of time in the presence of pain (table 5).

TABLE 5

THE EFFECT OF PAIN FROM ICE WATER ON TIME ESTIMATION

(1 minute)

Type of Test	No. Subjects	No. Tests	Pain (sec)	Control (sec)	s.e.d.	t	p
Tapping	16	16	66.3	69.5	3.23	0.99	> 0.10
Free Estimate	16	16	73.9	65.6	3.88	2.14	0.05

In the tests on muscular co-ordination (table 6), it was found that the degree of interference in the presence of pain varied with the type of test. Passing the ball is a very easy test, and here no significant effect was observed even during a 4-dol pain. The punchboard test requires more precision, and here the effect of pain is barely significant. The rotary pursuit device, which is still more refined, as far as co-ordination, precision, steadiness, and attention are concerned, showed a highly significant degree of interference. This differentiation as to the degree of refinement of these tests is used in the same way as tests of muscular co-ordination are used to determine the performance level of children. Considering the three different pain intensities used in these tests, it becomes clear also that the degree of interference depends on the pain intensity being used.

TABLE 6

THE EFFECT OF PAIN ON MUSCULAR COORDINATION (24 subjects)

Type of Test	Type of Pain	No. Tests	Pain	Control	s.e.d.	t	p
Passing ball	Ice water	36	70.6*	73.3*	1.46	1.86	0.10
Punchboard	Ice water	36	112.6	117.9	2.25	2.35	0.05
Punchboard	Press. cuff	32	113.2	116.8	1.98	1.82	0.10
Punchboard	Headgear	32	113.2	114.1	1.32	0.68	> 0.10
Rotary pursuit	Ice water	36	8.97	4.99	1.35	2.96	0.01
Rotary pursuit	Press. cuff	44	7.52	5.13	1.08	2.21	0.05
Rotary pursuit	Headgear	40	5.87	5.13	0.99	0.74	> 0.10

*Pain and control values for passing ball and punchboard refer to number of tasks per 90 seconds; for rotary pursuit, to number of mistakes. s.e.d. = standard error of the difference.

As far as reaction time is concerned (table 7), no significant results were obtained with simple reaction time. However, in the choice reaction time there was a significant increase with pain from cold, while the number of mistakes was unchanged. As far

TABLE 7

THE EFFECT OF PAIN FROM ICE WATER ON REACTION TIME

	No. Subjects	No. Tests	Pain (msec.)	Control (msec.)	s.e.d.	t	p
Simple reaction time	18	540	185.9	177.2	5.85	1.49	0.50
Choice reaction time	13	256	292.0	273.6	7.31	2.62	0.05

as the effect of pain is concerned, there is some support for Lemmon's[20] findings that simple reaction time parallels memory and choice reaction time parallels reasoning. The tests on the patellar reflex did not produce any significant results (table 8).

TABLE 8

THE EFFECT OF PAIN FROM A PRESSURE CUFF ON REFLEX ACTIVITY

	No. Subjects	No. Tests	Pain	Control	s.e.d.	t	p
Patellar reflex	11	165	8.5*	10.4*	1.15	1.65	0.10
Skin flare	12	24	51.8**	49.0**	0.87	3.22	0.01

*cm. **meter reading.

The skin flare threshold was significantly increased in the presence of pain (table 8). This might be an indication of a peripheral

inhibitory effect of pain, as indicated by the recent findings of Galambos, Sheatz, and Vernier.[21] However, at present we cannot be sure whether this is not purely a vasoconstrictor effect due to epinephrine released under stress.

Table 9 shows that pain does not affect work performance as measured with an ergometer bicycle under these experimental conditions. Table 10 shows that the respiratory rate was increased in pain during, but not after, exercise. While the tidal volume (table 11) shows no significant change, the respiratory

TABLE 9

THE EFFECT OF PAIN ON WORK PERFORMANCE
(bicycle ergometer; 24 subjects)

Type of Pain	No. Tests	Pain	Control	s.e.d.	t	p
Ice water	36	390.8	398.7*	4.16	1.90	0.10
Pressure cuff	24	341.5	336.2	3.14	1.69	> 0.10
Headgear	36	341.5	341.1	2.02	0.20	> 0.10

*Pain and control values refer to revolutions per 90 seconds. The experiments in line 1 were performed in mid-winter and those in line 2 and 3 in mid-summer. s.e.d. = standard error of the difference.

TABLE 10

THE EFFECT OF PAIN ON THE RESPIRATORY RATE
(24 subjects)

Type of Pain	No. Tests	Pain	Control	s.e.d.	t	p
A. During Exercise						
Ice water	36	23.3	20.4	1.35	2.11	0.05
Pressure cuff	24	26.5	23.1	1.54	2.21	0.05
Headgear	36	23.8	23.1	0.89	0.97	>0.10
B. After Exercise						
Ice water	36	19.5	18.0	0.97	1.49	>0.10
Pressure cuff	24	21.0	19.5	1.09	1.38	>0.10
Headgear	36	20.2	19.5	1.07	0.65	>0.10

minute volume (table 12) is markedly increased during, as well as after, exercise. Oxygen concentration is changed only in the pain produced by the pressure cuff during exercise (table 13). Oxygen consumption during exercise is the same with or without pain, but when pain is present during exercise, the oxygen consumption is markedly increased during the postexercise period (table 14). Also, under these conditions postexercise pulse rate is significantly increased (table 15). None of the above changes can be seen in the experiments with mild pain induced by the headgear. The findings are considered an indication that for

TABLE 11

THE EFFECT OF PAIN ON TIDAL VOLUME

(24 subjects)

Type of Pain	No. Tests	Pain (ml.)	Control (ml.)	s.e.d.	t	p
A. During Exercise						
Ice water	36	1,573	1,670	128	0.76	> 0.10
Pressure cuff	24	1,883	1,923	102	0.39	> 0.10
Headgear	36	1,904	1,923	89	0.21	> 0.10
B. After Exercise						
Ice water	36	1,561	1,421	92	1.56	> 0.10
Pressure cuff	24	1,758	1,652	94	1.13	> 0.10
Headgear	36	1,654	1,652	54	0.04	> 0.10

s.e.d. = standard error of the difference.

TABLE 12

THE EFFECT OF PAIN ON RESPIRATORY MINUTE VOLUME

(24 subjects)

Type of Pain	No. Tests	Pain (ml.)	Control (ml.)	s.e.d.	t	p
A. During Exercise						
Ice water	36	36,651	34,068	705	3.44	0.01
Pressure cuff	24	49,900	44,421	1,112	4.93	0.01
Headgear	36	45,315	44,421	504	1.77	0.10
B. After Exercise						
Ice water	36	30,440	25,578	983	4.95	0.01
Pressure cuff	24	36,918	32,214	1,054	4.46	0.01
Headgear	36	33,411	32,314	822	1.46	>0.10

TABLE 13

THE EFFECT OF PAIN ON OXYGEN CONCENTRATION

(24 subjects)

Type of Pain	No. Tests	Pain (%)	Control (%)	s.e.d.	t	p
A. During Exercise						
Ice water	36	16.8	16.7	0.08	1.81	0.10
Pressure cuff	24	17.5	17.1	0.09	4.44	0.01
Headgear	36	17.2	17.1	0.08	1.81	0.10
B. After Exercise						
Ice water	36	18.2	18.3	0.06	1.21	> 0.10
Pressure cuff	24	19.0	18.9	0.07	1.43	> 0.10
Headgear	36	18.8	18.9	0.07	1.43	> 0.10

s.e.d. = standard error of the difference.

416757 O - 57 - 3

short periods of exercise pain does not affect the amount of work performed. However, the effects on the respiratory and cardiovascular system show that the efficiency of performance is decreased.

TABLE 14

THE EFFECT OF PAIN ON OXYGEN CONSUMPTION (24 subjects)

Type of Pain	No. Tests	Pain (cc/min)	Control (cc/min)	s.e.d.	t	p
A. During Exercise						
Ice water	36	1,539	1,465	38.4	1.93	0.10
Pressure cuff	24	1,746	1,732	44.2	0.32	> 0.10
Headgear	36	1,718	1,732	39.8	0.35	> 0.10
B. After Exercise						
Ice water	36	846	693	38.1	4.04	0.01
Pressure cuff	24	738	677	29.8	2.05	0.05
Headgear	36	735	677	29.4	1.97	0.10

TABLE 15

THE EFFECT OF PAIN DURING EXERCISE ON THE POSTEXERCISE PULSE RATE (1/2, 1 1/2, 2 1/2 min.; 24 subjects)

Type of Pain	No. Tests	Pain	Control	s.e.d.	t	p
Ice water	36	118.5	115.7	1.33	2.11	0.05
		103.0	101.9	1.02	2.12	0.05
		88.3	89.5	1.01	1.19	> 0.10
Pressure Cuff	24	120.1	116.2	1.41	2.75	0.01
		109.2	105.8	1.27	2.68	0.02
		92.2	89.7	1.28	1.95	0.10
Headgear	36	117.3	116.2	1.19	0.08	> 0.10
		106.1	105.8	1.01	0.03	> 0.10
		89.3	89.7	0.92	0.04	> 0.10

s.e.d. = standard error of the difference.

DISCUSSION

In this study, certain changes of performance in the presence of pain were demonstrated. However, this is no indication that the subject's capability to perform such a task is impaired. The results might be explained equally well by lack of concentration, motivation, visual disturbances, or a number of other factors. This study deals with pain and the resulting changes of performance without any attempt to determine any of the intermediate steps or mechanisms.

A variety of tests was used in this investigation, some of a more physical character and others of a more mental character.

This does not mean that the process underlying the individual performance tests is necessarily different, and the point of interference in the presence of pain might well be common to all of them. However, it is believed that with our present state of knowledge no conclusion regarding any specific type of performance can be drawn without testing this particular performance directly. The results show also a different type of response to pain for these two groups of tests.

In addition to these limitations, there are some specific restrictions due to the particular methods used in this investigation.

1. The subjects of these experiments were a selected group, limited in age and sex. This was done intentionally to get sufficient uniformity so that the data could be analyzed statistically.

2. The subjects for these experiments were volunteers. Probably in a volunteer group the fear of pain is not as pronounced as in the general population. Closely associated with the fear of pain are the emotional component of pain and the reaction to pain which, then, in our selected group are probably less pronounced than in the rest of the population.

3. In these tests we used only experimentally induced pain in which the subject is fully familiar with the cause of the pain. He knows how long the pain will be present, and that no danger is connected with it. Therefore, the threat content of this is not as marked as that of pain from disease or trauma of identical intensity.

All of these factors tend to decrease possible effects of pain on performance as measured in this study. Therefore, what is not significant in our results may become significant under less restricted conditions. However, it is unlikely that any significant changes found here might not hold up in a less selected group.

Another difficulty in the interpretation of our results is the problem of pain intensity. We used in these tests three different types of pain, which clearly represent three different pain intensities. However, they differed in other respects as well as in pain intensity. Therefore, any interpretation of the effect of pain intensity must be made with this limitation in mind.

SUMMARY

Using various types of pain stimuli and taking each subject as his own control, the following observations regarding the effect of pain on performance were made:

1. Tests involving primarily memory and the speed of performing various mental tasks are not affected by simultaneous pain.

2. In tests involving simple mental tasks, the number of mistakes is increased in the presence of pain, and this increase

appears to be independent of the pain intensity (up to 4 or 5 dols).

3. In tests involving higher mental tasks, the number of mistakes is increased and this increase corresponds roughly to the pain intensity.

4. Time estimation is increased, which is considered an overcompensation for the apparently slow passage of time in pain.

5. Pain impairs the performance in tests of muscular co-ordination. The degree of interference apparently increases with the pain intensity and also with the degree of refinement of the task to be performed.

6. Simple reaction time is not affected by simultaneous pain, while choice reaction time is prolonged.

7. The mean amplitude of the patellar reflex is not significantly affected by pain, while the threshold of the skin flare reaction is significantly raised.

8. In short tests of work performance, the total work is not significantly altered by simultaneous pain. However, the efficiency of performing the work, as indicated by changes of the cardiovascular and respiratory system, is markedly decreased by simultaneous pain.

REFERENCES

1. Hardy, J. D.; Wolff, H. G.; and Goodell, H.: *Pain Sensations and Reactions.* Williams & Wilkins Co., Baltimore, Md., 1952. pp. 146-172; 292-297.

2. Lacey, J. I.; and VanLehn, R.: Differential emphasis in somatic response to stress; experimental study. *Psychosom. Med.* 14: 71-81, Mar.-Apr. 1952.

3. Malmo, R. B.; Shagass, C. S.; and Davis, F. H.: Specificity of body reactions under stress. In Association for Research in Nervous and Mental Disease: *Life Stress and Bodily Disease;* proceedings of the Association, Dec. 2 and 3, 1949. Research Publications, Vol. 29. Williams & Wilkins, Baltimore, Md., 1950.

4. Medvei, V. C.: *The Mental and Physical Effects of Pain.* Buckston Browne Prize Essay, Harveian Society of London, 1948. E. & S. Livingstone, Edinburgh, Scotland, 1949.

5. Beebe-Center, J. G.: *The Psychology of Pleasantness and Unpleasantness.* D. Van Nostrand Co., Inc., New York, N. Y., 1932.

6. Behan, R. J.: *Pain.* D. Appleton, & Co., New York, N. Y., 1915.

7. Cannon, W. B.: *Bodily Changes in Pain, Hunger, Fear and Rage.* 2d edition. D. Appleton-Century Co., Inc., New York, N. Y., 1929.

8. Lantz, C. M. B.: *Some Dynamic Aspects of Success and Failure.* Psychological Monographs Vol. 59, No. 1; whole No. 271, edited by John F. Dashiell, American Psychological Association, 1945.

9. Lazarus, R. S.; Deese, J.; and Osler, S. F.: Effect of psychological stress upon performance. *Psychol. Bull.* 49: 293-317, July 1952.

10. Lindsley, D. B.: *A Study of Performance Under Speed Stress.* Informal Memorandum No. 28, Sept. 10, 1945; NDRC Project SC-70, NS-146.

11. Lewis, T.: *Pain.* The Macmillan Co., New York, N. Y., 1942.

12. Troland, L. T.: *Fundamentals of Human Motivation.* D. Van Nostrand Co., Inc., New York, N. Y., 1928.

13. Burtt, H. E., and Tuttle, W. W.: Patellar tendon reflex and affective tone. *Am. J. Psychol.* 36: 553-561, Oct. 1925.

14. Deese, J.; Lazarus, R. S.; and Keenan, J.: Anxiety, anxiety reduction, and stress in learning. *J. Exper. Psychol.* 46: 55-60, July 1953.

15. Diethelm, O., and Jones, M. R.: Influence of anxiety on attention, learning, retention and thinking. *Arch. Neurol. & Psychiat.* 58: 325-336, Sept. 1947.

16. Fedotov, I. P.: Action of painful stimulation on reflex activity of spinal cord. Report 3, The Influence of Painful Stimulation on the Patellar Reflex. *Fiziol. Zh. SSSR* 36: 436-444, 1950; abstract, *Psychol. Abstr.* 26: 203, No. 1926, 1952.

17. Hines, E. A., Jr., and Brown, G. E.: Standard stimulus for measuring vasomotor reactions; its application in study of hypertension. *Proc. Staff Meet., Mayo Clin.* 7: 332-335, June 8, 1932.

18. Steinberg, H.: Changes in time perception induced by an anaesthetic drug. *Brit. J. Psychol.* 46: 273-279, Nov. 1955.

19. Kelso, L. E. A., and Hellebrandt, F. A.: Recording electrodynamic bicycle ergometer. *J. Lab. & Clin. Med.* 19: 1105-1113, July 1934.

20. Lemmon, V. W.: Relation of reaction time to measures of intelligence, memory and learning. *Arch. Psychol.* No. 94, 1-3, Nov. 1927.

21. Galambos, R.; Sheatz, G.; and Vernier, V. G.: Electrophysiological correlates of conditioned response in cats. *Science* 123: 376-377, Mar. 2, 1956.

PROGRESS IN PREVENTIVE MEDICINE

"The progress of medicine is strikingly revealed when the present is compared with the past. The life expectancy of an infant at birth in the early days of the United States was actually less than the age at which the medical student of today completes his formal education; he can afford to prolong his schooling far beyond what would once have been considered reasonable because the duration of his expected productive period has been so greatly prolonged.

The importance of preventive medicine is appreciated only if one recalls the pestilences and similar calamities of the past. Further reduction of the mortality and morbidity from accidents is obviously possible. The prevention of such conditions as arteriosclerosis and hypertension will be more difficult."

—JAMES WATT, M. D.
in *Journal of the American Medical Association*, p. 1351, Aug. 4, 1956

PSYCHIATRIC PREDICTION AND MILITARY EFFECTIVENESS

Part III.* Factors Influencing Psychiatrists

ALBERT J. GLASS, *Colonel, MC, USA*
FRANCIS J. RYAN, *Captain, MSC, USA*
ARDIE LUBIN, *Ph. D.*
C. V. RAMANA
ANTHONY C. TUCKER, *Colonel, MSC, USA*

A STUDY reporting the ability of psychiatrists to forecast the future military usefulness of recent inductees was initiated in 1951.[17,18] In that study, 505 randomly selected basic trainees were evaluated by military psychiatrists at six Army training centers. Findings of the psychiatric examinations were recorded on standardized forms to facilitate a uniform collection of data which, in addition to a narrative summary in each case, included (1) background information from the subject relative to the early formative environment and preservice adjustment; (2) clinical impressions of the psychiatrist as to the degree of psychopathology, if any, and the intelligence level; and (3) the psychiatrist's estimation of the subject's future military effectiveness when assigned to a combat zone or to a noncombat area.

After the subjects had completed two years of Army service, their performance of duty was rated from personnel and medical records and compared with the psychiatrists' predictions that were made early in basic training. Results clearly indicated that experienced military psychiatrists were unable to efficiently identify the potentially unsatisfactory soldier.

This report represents an effort to explore some of the causes for error in psychiatric prediction by determining which items of recorded information that were available to the psychiatrists had the largest apparent influence upon their estimation of the subjects' later military usefulness. Such an investigation could not

*Parts I and II were published in the October and November 1956 issues of this Journal.

From Walter Reed Army Institute of Research, Washington 12, D. C.

establish conclusively a cause-and-effect relationship between the examination data and the predictions because unrecorded perceptions and impressions may have played a major role in the final judgment of at least some of the psychiatrists. However, if it can be demonstrated that certain elements of the family history, preservice adjustment, or clinical impression regularly influenced the psychiatrists to make erroneous deductions of future duty performance, this knowledge could be used to improve psychiatric screening technics.

METHOD

Items of the psychiatric examination, psychiatric predictions, and performance ratings were coded and punched on standard electric accounting machine cards and correlations made. Differences in predictions among the six psychiatrists who participated in the study were explored. For simplicity, the only prediction used was prediction for service in a noncombat area; however, relatively little variation was noted between predictions for combat duty and those for noncombat assignment.

RESULTS

An obvious over-all result should be noted before any details are given. The psychiatrists predicted satisfactory performance for only 76 per cent of the sample, whereas 89 per cent rendered adequate service. This underestimation of satisfactory performance indicates that the psychiatrists tended to overemphasize unfavorable aspects of histories, interview impressions, or other examination findings.

Family History. In estimating potential adaptability, it is common for psychiatrists to be negatively influenced by a history of unfavorable or traumatic circumstances in the early formative years. Table 20 illustrates the relationship of adverse childhood situations to psychiatric predictions of future effectiveness and to ratings of actual performance. The results indicate that the psychiatrists participating in this study were only mildly influenced by the past environment. When the individual categories are compared with the over-all group it will be noted that there were six categories which had a P value indicating a significant difference (using .05 level of confidence) from the entire group in the percentage *predicted* to give satisfactory duty. Only two of these categories had a P value indicating a significant difference from the total group in the percentage who *performed* satisfactory duty. One may conclude from these findings that major sources of error in psychiatric prediction cannot be charged to an overemphasis on unfavorable childhood events as deleterious to successful military duty, although admittedly there was some overweighting of the importance of religion and the mother-child relationship.

TABLE 20. *Relationship of family history to prediction and performance*

Category	Totals	Satisfactory duty			
		Predicted		Performed	
		Per cent	P value*	Per cent	P value*
Entire group	505	76		89	
Psychosis, neurosis, or personality disorder of siblings	48	54	.001	73	.001
Psychosis, neurosis, or personality disorder of mother	75	59	.001	81	.05
Psychosis, neurosis, or personality disorder of father	66	67	.1	83	.2
Overt sibling rivalry	68	66	.1	84	.3
Marginal or relief economic status of parents	224	67	.001	84	.01
Death, divorce, separation, severe chronic illness, or other reason for absence of one or both parents	148	72	.3	86	.5
Moderate to marked parental disharmony	126	74	.7	84	.1
Religion not a positive force in the home	197	69	.01	87	.3
Over-attachment, resentment, ambivalence toward mother	103	59	.001	83	.1
Over-attachment, resentment, ambivalence toward father	121	72	.3	86	.4
Extreme discipline, permissiveness, or ambivalence of mother	177	69	.01	84	.3
Extreme discipline, permissiveness, or ambivalence of father	194	73	.3	85	.3

*P values indicate the statistical significance of the differences between the percentages of individual items of prediction and performance and the percentages of their respective total groups.

Preservice Adjustment. Probably the most frequently used indicator of future effectiveness is past performance. In this connection, adjustment to school and work, social and recreational habits, and degree of conformity to community customs are considered to represent reliable patterns of behavior that are likely to be repeated even under quite different circumstances. Thus, from both a common-sense viewpoint and personality theory, previous adaptability is used as a rational basis for acceptance or rejection by employers, admission to college, promotion, and even financial risk.

Table 21 demonstrates the relationship of faulty preservice adjustment to psychiatric prediction and performance. A rating of questionable or impaired preservice adjustment was scored on the basis of the following criteria.

TABLE 21. *Relationship of preservice adjustment to prediction and performance*

Category	Totals	Satisfactory duty			
		Predicted		Performed	
		Per cent	P value*	Per cent	P value*
Entire group	505	76		89	
Questionable or impaired adjustment to:					
Community	36	28	.001	67	.001
Work	71	32	.001	77	.001
Social and recreational activities	79	46	.001	80	.01
School	152	49	.001	80	.001
Parental family	86	56	.001	80	.01
Sex	124	69	.05	89	ns

*P values indicate the statistical significance of the differences between the percentages of individual items of prediction and performance and the percentages of their respective total groups.

Community: Delinquency, overt crimes, or troublemaking short of criminal behavior (alcoholism, public brawling, et cetera).

Work: Inability to maintain steady employment (floating from job to job), inadequacy, or continued difficulties with employers or employees.

Social and recreational activities: Seclusive, overly aggressive, or hostile behavior or absence of recreational life.

School: Consistent pattern of failure, repeated truancy, or serious disciplinary difficulties.

Parental family: Repeated running away from home, incessant quarrels with parents, or excessive dependency upon family.

Sex: Repressed sexual drive (manifested by lack of sexual activity and overly moral attitudes), excessive preoccupation with sex, or persistent overt homosexual drives.

It is evident from table 21 that, as usual, psychiatric prediction was strongly influenced by disturbances in preservice adjustment.

All unfavorable criteria were significantly related to rather sharp decreases in predictions of satisfactory service. Except in the sphere of sexual adjustment, this judgment was confirmed, at least statistically, by performance rating. Here the obvious error in psychiatric prediction was not one of direction or quality but rather of degree or quantity. For example, only 28 per cent of subjects with a history of questionable or impaired community adjustment were estimated to give satisfactory duty. However, 67 per cent rendered adequate service. Also, only 32 per cent of subjects with poor work records were considered to be potentially effective soldiers, yet 77 per cent functioned satisfactorily. Similarly, other categories of questionable and impaired adjustment were strongly related to unfavorable predictions but only mildly influenced performance.

This error of the psychiatrists does not disprove common-sense reasoning or personality theory. Rather, it highlights the unique difficulties inherent in any effort to predict the later behavior of youthful subjects. The individuals in this study, whose ages ranged from 19 to 24 years, had not as yet established firm patterns of adjustment but were in a formative and malleable stage and subject to change by external events and internal pressures. This transitional state was particularly evident in the sphere of sexual adjustment, in which the group scored as maladjusted nevertheless rendered an average proportion of satisfactory duty. Obviously it is difficult, if not impossible, to estimate sexual normality in individuals in late adolescence and early adulthood.

Psychopathology. The psychiatrists were asked to record their over-all clinical impression of each subject based upon background data and interview evaluation. Table 22 illustrates the apparent effect of clinical impression upon prediction and the relationship of such diagnostic categories to performance. As expected, the psychiatrists were markedly influenced by their own estimate of psychopathology to give unfavorable predictions. But performance ratings demonstrate that clinical impression was of relatively little value in identifying the unsatisfactory soldier. The results in table 22 indicate that in psychiatric prediction, one should pay little attention to a clinical impression of a potential neurosis or behavior disorder represented by such diagnoses as neurotic personality, suggestive neurosis, or pathologic personality. On the other hand, the presence of overt mental disease at the time of evaluation is correlated with future unsatisfactory duty, particularly if the mental illness is of psychotic proportions.

Intelligence. Intellectual ability is another commonly used index of potential capability, and numerous intelligence test batteries have been devised for this purpose. The psychiatrists of

TABLE 22. *Relationship of psychopathology to prediction and performance*

Category	Totals	Satisfactory duty			
		Predicted		Performed	
		Per cent	P value*	Per cent	P value*
Entire group	505	76		89	
Well integrated	273	94	.001	93	.01
Neurotic personality	131	73	.3	89	ns
Suggestive neurosis	38	31	.001	84	.7
Pathologic personality	38	48	.001	82	.3
Overt neurosis	22	14	.001	68	.05
Latent or overt psychosis	3	0	.001	0	.001

*P values indicate the statistical significance of the differences between the percentages of individual items of prediction and performance and the percentages of their respective total groups.

this study were also requested to record their estimation of each subject's intelligence from clinical observations made during the examination. Table 23 shows the relationship of these intelligence evaluations to the predictions that were made and to performance ratings. It should be noted that in the previously published reports of this study, the psychiatrists' clinical ratings of intelligence were highly correlated with other measures of intellectual ability such as educational attainment and the Armed Forces Qualification Test (AFQT).

TABLE 23. *Relationship of intelligence to prediction and performance*

Category	Totals	Satisfactory duty			
		Predicted		Performed	
		Per cent	P value*	Per cent	P value*
Entire group	505	76		89	
Intelligence estimate:					
Superior	38	97	.01	95	.2
Average or above	360	85	.001	91	.1
Below average	97	43	.001	79	.02
Deficient	10	0	.001	70	.8

*P values indicate the statistical significance of the differences between the percentages of individual items of prediction and performance and the percentages of their respective total groups.

The results in table 23 demonstrate a striking and significant relationship between intelligence as perceived by the psychiatrist and his prediction of later performance. Only one subject judged to be of superior intelligence was predicted to be unsatisfactory. This expectation was largely confirmed by subsequent performance. There were no predictions of satisfactory performance for the 10 subjects considered mentally deficient; however, 7 rendered satisfactory duty. Similarly, in the below-average intelligence category only 43 per cent were considered as potentially satisfactory, yet 79 per cent functioned efficiently. This error of psychiatric prediction is again demonstrated to be due to an overemphasis on unfavorable findings as deleterious to successful military service. More specifically, the results indicate that limited intellectual ability does not necessarily imply potentially unsatisfactory duty, although average or superior intelligence is a good indication of future military effectiveness.

Interview Behavior. Another element of the examination data which seemed to have strongly influenced the psychiatrists in assessing potential effectiveness was the interview behavior of subjects as reported in the narrative summary. Included in many of the summaries were statements by the psychiatrist relative to the impression made by the subject. Not all of the psychiatrists recorded impressions of the men they examined. Two of the psychiatrists almost never did, but in 244 subjects there were sufficient data to classify interview behavior. The following assumption was tested: namely, that the psychiatrists' impressions of interview behavior during the examination strongly influenced their prediction of future military performance. Statements recorded by the psychiatrists relative to interview behavior were independently classified by two of the raters (FJR and AJG) as (1) favorable, (2) mixed, or (3) unfavorable. The objective validity of the rating scale seemed justified in that better than 90 per cent agreement of the ratings was found. In the few cases of disagreement, a mutual decision was achieved by re-examining the record.

A typical favorable impression was as follows:

> Enlisted man is an alert, co-operative white male who volunteered information spontaneously. He accepted the explanation for the interview situation readily and was at ease throughout the interview. He appeared of average intelligence and his veracity was high.

A mixed impression was scored in cases where the psychiatrist recorded both favorable and unfavorable qualities, as follows:

> The man was co-operative and alert. He volunteered little information spontaneously but answered questions readily. When talking about his parents he cried freely without any attempt at control. There was some evidence of tenseness at the beginning of the interview.

An unfavorable rating was given if the psychiatrist's impression was entirely negative, as follows:

> Patient appears impulsive, somewhat erratic, given to fluctuating emotional attitudes. Seems to have a character and behavior disorder.

The relationship of interview behavior as rated by the above method to prediction and performance is given in table 24. The results indicate that whenever psychiatrists were favorably impressed by interview behavior to the extent of making positive statements to this effect in written summaries, successful duty performance was almost invariably predicted. A favorable interview impression apparently influenced prediction for satisfactory service more than any other component of the psychiatric examination. That such a viewpoint or orientation was valid or correct is supported by ratings of subsequent performance.

TABLE 24. *Relationship of interview behavior to prediction and performance*

Interview behavior	Number	Satisfactory duty	
		Predicted (per cent)	Performed (per cent)
Favorable	117	97	97
Mixed	80	76	91
Unfavorable	47	17	75

The potent effect of interview behavior upon prediction is further supported by the finding that when psychiatrists received an unfavorable impression of the subject, they usually predicted substandard performance (17 per cent). The negative influence of this factor on prediction was only exceeded by that of a diagnosis of overt neurosis or psychosis (14 and 0 per cent) (table 22) or of mental deficiency (0 per cent) (table 23). But unfavorable interview behavior did not correlate with subsequent performance for, as shown in table 24, 75 per cent in this category rendered satisfactory duty. As stated in previous reports of this study, satisfactory predictions based upon favorable criteria are usually valid, but unfavorable findings are not necessarily related to poor duty performance. In other words, identifying the potentially

unsatisfactory soldier is a far more difficult task than identifying the successful soldier.

Differences Among Psychiatrists. Thus far psychiatric predictions have been regarded as originating from a single source. However, there were six separate sources in the form of six psychiatrists, each of whom made judgments that were undoubtedly influenced by past training, previous clinical experience, and personal bias. In order to investigate the extent of error due to variability of psychiatric opinion, the proportion of success and failure that was predicted by each psychiatrist was determined (fig. 3). It is apparent that there were several quite different patterns of psychiatric prediction. For example, the psychiatrist

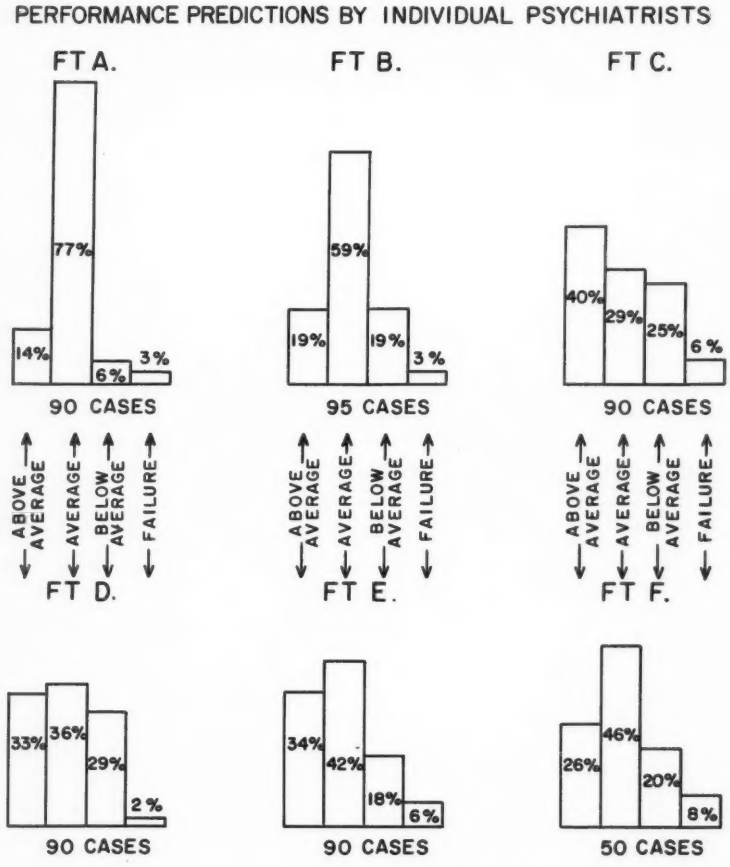


Figure 3. Graphs showing performance predictions by individual psychiatrists in six Army camps.

at Fort A perceived most subjects as average. Not so the psychiatrist at Fort C, who found more superior than average subjects and predicted that a large number (31 per cent) would be below-average or poor soldiers. The psychiatrist at Fort D forecast almost no failures but divided his predictions almost equally among the superior, average, and below-average categories.

It may be argued that the above variability in psychiatric predictions represented a different distribution of personality types in the six examined groups rather than differences derived from the psychiatrists. But figure 4 demonstrates that the performance of the various groups was relatively similar with only minor variations. Therefore, it follows that in psychiatric prediction there is included an ill-defined component of personal bias

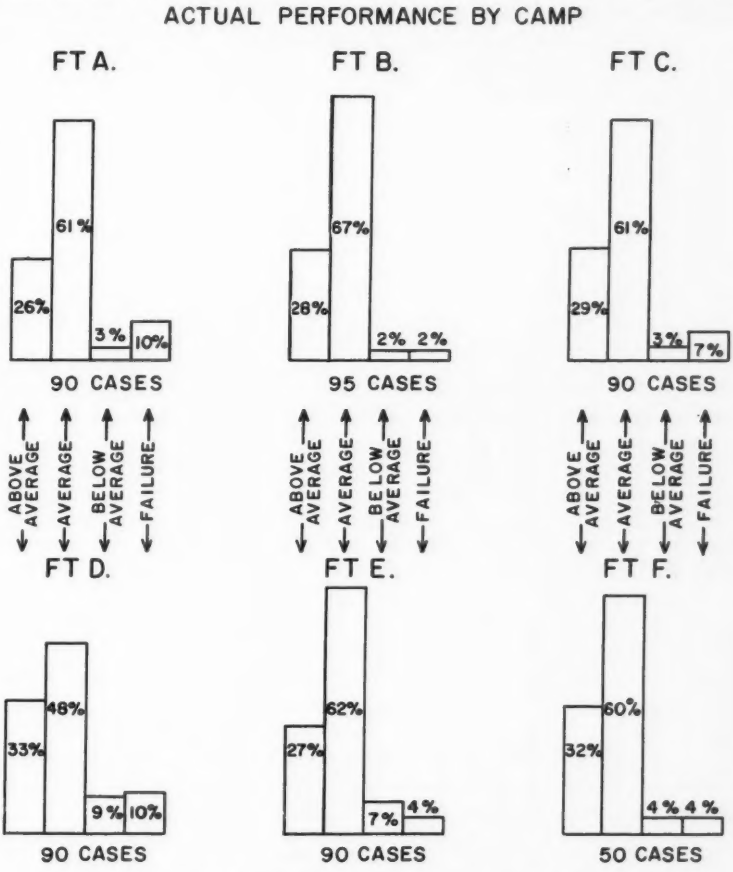


Figure 4. Graphs showing actual performance in six Army camps.

that varies in quantity and quality from one psychiatrist to another. This lack of uniformity in prediction among even experienced military psychiatrists is a serious and important obstacle to efficient psychiatric screening. How much more unlikely could a reasonable uniformity of judgment be attained by hundreds of psychiatrists with varying backgrounds of training and experience who would be called upon to perform a similar function at induction stations or training centers in time of full mobilization.

SUMMARY

Using 505 basic trainees as a sample, this study has explored the relationship between certain factors (early environment, preservice adjustment, psychopathology, intelligence, and interview behavior) and the psychiatrists' prediction of military performance as compared with subsequent actual performance. Also investigated was the uniformity of psychiatric prediction as accomplished by six different psychiatrists. The objective of the study was to determine what influenced the psychiatrists in arriving at their estimations of future military usefulness in recent inductees. If it were possible to better understand the elements of the psychiatric examination that motivated the judgment of the psychiatrists, it might be feasible to demonstrate which of these influences had validity in the light of subsequent performance and which criteria should be disregarded.

It is believed that the results obtained from the study justify the following conclusions:

The examining psychiatrists, in arriving at predictions of performance for inductees, did not place major emphasis on unfavorable items of the family history and early environment. Although this finding was contrary to expectation, the study indicates psychiatrists were justified in their action. Background data such as emotional disturbances of family members, broken home, and a difficult relationship with the family were only mildly related to levels of performance.

Psychiatrists tended to rely more heavily on data of past performance, such as preservice adjustment to school, work, and the community. The psychiatrists were partially correct in that previous adjustment was more significantly related to success or failure in the Army than family background categories of information. Here the error of the psychiatrist was one of degree because a majority of subjects with a history of faulty preservice adjustment nevertheless did render satisfactory service.

Psychiatrists were strongly motivated by their own diagnoses of psychopathology or intellectual deficiency to predict unsatis-

factory performance. Results of this study indicate that one should pay little attention to potential neuroses or behavior disorders in psychiatric prediction. But the presence of overt neurosis or psychosis does correlate highly with future unsatisfactory duty. Similarly, limited intellectual capacity does not preclude satisfactory military service.

Psychiatrists were markedly influenced by the interview behavior and appearance of subjects. In practically all cases in which a favorable interview impression was recorded, successful performance was predicted, often in spite of unfavorable background information. This finding suggests that the psychiatrists in this study fell back on intuitive judgments and reacted more to the external appearance of subjects and behavior exhibited during the interview than to the content of the interview itself. It was found that a favorable impression was substantiated by later effective performance. However, unfavorable impressions were not equated with unsatisfactory service.

In essence, this study indicates that the psychiatrist can safely proceed upon his favorable impression of a subject but must be wary of predicting failure for a subject who exhibits unfavorable qualities. It also clearly demonstrates that there were important individual differences among psychiatrists in arriving at predictions of later performance. The six psychiatrists of this study were required to use a specifically defined examination procedure designed to produce a relatively uniform body of information from all subjects. Also, the actual performance of the rated groups was comparable. Yet, psychiatrists' predictions for these groups differed significantly, and these differences must be attributed to variations among psychiatrists in matters of personality, training, and experience.

REFERENCES

17. Glass, A. J.; Ryan, F. J.; Lubin, A.; Ramana, C. V.; and Tucker, A. C.: Psychiatric prediction and military effectiveness; part 1. *U. S. Armed Forces M. J.* 7: 1427-1443, Oct. 1956.

18. Glass, A. J.; Ryan, F. J.; Lubin, A.; Ramana, C. V.; and Tucker, A. C.: Psychiatric prediction and military effectiveness; part 2. *U. S. Armed Forces M. J.* 7: 1575-1588, Nov. 1956.

416757 O - 57 - 4

USE OF X-RAYS AND OTHER IONIZING RADIATION

The Responsibilities of the Medical Profession

UNITED NATIONS SCIENTIFIC COMMITTEE
ON EFFECTS OF ATOMIC RADIATION

PUBLIC health problems created by the development of atomic energy caused the United Nations General Assembly to establish a Scientific Committee on the Effects of Atomic Radiation. One of the most urgent tasks of this Committee is to collect as much information as possible on the amount of radiation to which man is exposed today, and on its effects. Because a substantial proportion of the total radiation received is due to diagnostic radiology and radiotherapy, the Committee considers it desirable to draw attention to information that has been obtained on this subject.

Modern medicine has contributed to the control of many diseases and has substantially prolonged the span of human life. These results have depended in part on the use of radiation in the detection, diagnosis, and treatment of disease. It is desirable, however, to review objectively the possible present or future consequences of increased irradiation of populations which result from these medical applications.

It is now accepted that the irradiation of human beings, and particularly of their germinal tissues, has certain undesirable effects. While many of the somatic effects of radiation may be reversible, germinal irradiation normally has an irreversible and therefore cumulative effect. Any irradiation of the germinal tissues, however slight, thus involves genetic damage which may be small but is nevertheless real. For somatic effects there may be thresholds for any irreversible effects, although if so these thresholds may well be low.

The radiation due to natural sources has been estimated to cause between 70 and 170 millirem (milli-roentgen equivalent man) of irradiation to the gonads per annum in most parts of countries in which it has been studied, although higher values are found locally in some areas. In addition, the human race is

subjected to artificial radiation due to medical applications, to atomic industry and its effluents, and to the radioactive fall-out from nuclear explosions.[1] The Committee is aware of the potential hazards that such radiation involves, and is collecting and examining information on these subjects. The amount of radiation received by the population for medical purposes is now, in certain countries, the main source of artificial radiation, and in Sweden and the United States is probably about equal to that from all natural sources. Moreover, since it is given on medical advice, the medical profession exercises responsibility in its use.

The Committee appreciates the importance and value of the correct medical use of radiation, both in the diagnosis of a large number of conditions and in the treatment of many such diseases as cancer, in the early mass detection of conditions such as pulmonary tuberculosis, and in the extension of medical knowledge. Moreover, it appreciates fully the contribution of the radiological profession, through the International Commission on Radiological Protection,[2] in recommending maximum permissible levels of irradiation. As regards those whose occupation exposes them to radiation, the establishment of these levels depends on the view that there are doses which, according to present knowledge, do not cause any appreciable body injury in the irradiated individual; and also on the consideration that the number of people concerned is sufficiently small for the genetic repercussions upon the population as a whole to be slight. Whenever exposure of the whole population is involved, however, it is considered prudent to limit the dose of radiation received by germinal tissue from all artificial sources to an amount of the order of that received from the natural background radiation.

It appears most important, therefore, that medical irradiations of any form should be restricted to those which are of value and importance, either in investigation or in treatment, so that the irradiation of the population may be minimized without any impairment of the efficient medical use of radiation. The Committee is consequently anxious to receive information through appropriate governmental channels as to the methods and the extent by which such economy in the medical use of radiation can be achieved, both by avoiding examinations which are not clearly indicated and by decreasing the exposure to radiation during examinations, particularly if the gonads, or the fetus during pregnancy, lie in the direct beam of radiation. It seeks, in particular, to obtain information as to the reduction in radiation of the population that might be achieved by improvements in instrument design, by fuller training of personnel, by local shield-

ing of the gonads, by choosing appropriately between radiography and fluoroscopy, and by better administrative arrangements to avoid any unnecessary repetition of identical examinations.

The Committee also seeks the co-operation of the medical profession to make possible an estimate of the total radiation received by the germinal tissue of the population before and during the childbearing age. It considers it to be essential that standardized methods of measurement, of types at present available, should be widely used to obtain this information; and it emphasizes the value of adequate records, maintained by those using radiation medically, by the dental profession, and by the responsible organizations, in allowing such radiation exposure to be evaluated. The Committee is convinced that information of this type will make it possible to decrease the total medical irradiation of the population while preserving and increasing the true value of the medical uses of radiation.

REFERENCES

1. United Kingdom Medical Research Council: *Hazards to Man of Nuclear and Allied Radiations.* Her Majesty's Stationery Office, London, June 1956.

2. Report of the International Commission on Radiological Protection. *Brit. J. Radiol.* (Supp. 6) Dec. 1954.

THE COMMUNITY PAYS

"Alcohol damages the community, as far as tuberculosis is concerned, in the following ways:

1. It increases the mortality rate.

2. By unnecessarily prolonging illness, it adds tremendous cost to taxpayers, not only for expensive hospitalization but also for public aid to dependents.

3. It increases the length and degree of contagiousness of the alcoholic with tuberculosis."

—DAN MORSE, M. D.
in *Bulletin of the National Tuberculosis Association*
p. 157, Nov. 1956

TREATMENT OF PARAPHIMOSIS

RICHARD W. CLETSOWAY, *Captain, MC, USAR*
EVAN L. LEWIS, *Lieutenant Colonel, MC, USA*

PARAPHIMOSIS is the condition where a tight or inflamed foreskin is caught proximal to the glans penis and the patient cannot replace the foreskin in its normal position. This tight foreskin occludes circulation and causes swelling of the subcutaneous tissues between the glans and the constricting band. If this condition is prolonged, there may be tremendous swelling, gangrene of the constricting band, and eventually gangrene of the entire penis distal to the band. The treatment of paraphimosis outlined in the standard books of urology[1-4] are: (1) hot applications and cleansing of the lesion; (2) manual reduction of the foreskin and, in case this is unsuccessful, (3) dorsal slit followed by circumcision after the dorsal slit heals and the inflammation and swelling subside. The first method is to be condemned for delaying definitive therapy. The second method should be tried and will be successful in the majority of early cases. It is the third method, dorsal slit, that we intend to discuss.

This method seems to involve an unduly long morbidity. Dorsal slit relieves the circulatory embarrassment caused by the constricting band, but the edema subsides only slowly. The method also leaves a wound, which theoretically should be allowed to heal prior to definitive therapy by circumcision. Ideally, the edema subsides, the wound heals, and the inflammation disappears so that circumcision can be performed in from 2 to 3 weeks. Circumcision produces another 7 to 10 day morbidity. By morbidity is meant not necessarily hospital time, but a period of incapacity due to pain and swelling. This unsatisfactory total morbidity of from 3 to 4 weeks is frequently markedly prolonged when the dorsal slit, which is made across edematous, anoxic tissue, becomes infected.

CASE REPORT

A 21-year-old corporal was transferred from a nearby dispensary to this hospital on 14 October 1953 with a marked paraphimosis and necrosis of the dorsal portion of the constricting band. This condition had been treated as balanitis for five days with antibiotics and soaks. Immediately on arrival, the patient was taken to surgery, where a dorsal

From Tokyo Army Hospital, APO 500, San Francisco, Calif. Dr. Cletsoway is now at 1235 Morro Street, San Luis Obispo, Calif.

slit was done. It was not until 27 October, 13 days later, that he was ready for circumcision. He was released 31 October. Total morbidity—22 days.

We could not see why immediate circumcision could not be done in those cases where dorsal slit had been indicated. This would eliminate the dorsal slit operation; anesthesia would be required once rather than twice; and the morbidity would be decreased by that long period between dorsal slit and circumcision. There seemed to be no greater possibility of infection of the circumcision wound than of the dorsal slit wound, and with the use of prophylactic antibiotics the procedure seemed even more feasible. In reviewing the literature, the only pertinent reference found was a description of immediate circumcision in 42 cases of infected phimosis.[5] The author cited a marked improvement in results with "Healing per primam, 9 cases; healing satisfactory, 18 cases; some infection along suture line, 11 cases; healing slow, 4 cases." At the time, antimicrobial therapy was limited to sulfanilamide, sulfapyridine, and sulfathiazole given in very limited amounts.

Our method is to operate as soon as possible after the patient is first seen. The anesthetics used are Pentothal Sodium (brand of thiopental sodium) injected intravenously, and nitrous oxide and oxygen by mask. Circumcision is done by the dorsal slit technic removing all the edematous foreskin, ulcerated area, and grossly inflamed skin down to fairly normal skin on the penile shaft. Although the mucous membrane reflected from the glans is edematous and somewhat friable, no difficulty has been encountered in the suturing when a No. 0 plain catgut, continuous suture is used. A petrolatum-impregnated gauze dressing is applied; this is removed completely on the second postoperative day. Five hundred milligrams of Terramycin (brand of oxytetracycline) is given four times daily for five days.

Since August 1953, we have performed immediate circumcision on 13 patients with paraphimosis for whom dorsal slit would usually be indicated. Eleven of this number showed ulceration and gangrene at the site of the constricting band. All incisions healed by primary intention and no patient had a morbidity or hospital stay longer than for the average circumcision. If anything, the wounds healed faster and looked better than those of some patients who had had routine circumcisions without receiving antibiotics.

CASE REPORT

A 25-year-old corporal was transferred to this hospital on 15 September 1953 from a nearby United Nations dispensary. He had a history of "balanitis" for 5 days, for which he had been treated with antibiotics and soaks, with a gradual increase in swelling and pain (fig. 1). He

was found to have a marked paraphimosis with ulceration of the constricting band on the dorsum of the penis. The paraphimosis could not be manually reduced without severe pain. The patient was taken immediately to surgery where circumcision was done as previously described (fig. 2). The patient made an uneventful recovery and was returned to the referring unit on the fourth postoperative day (fig. 3).

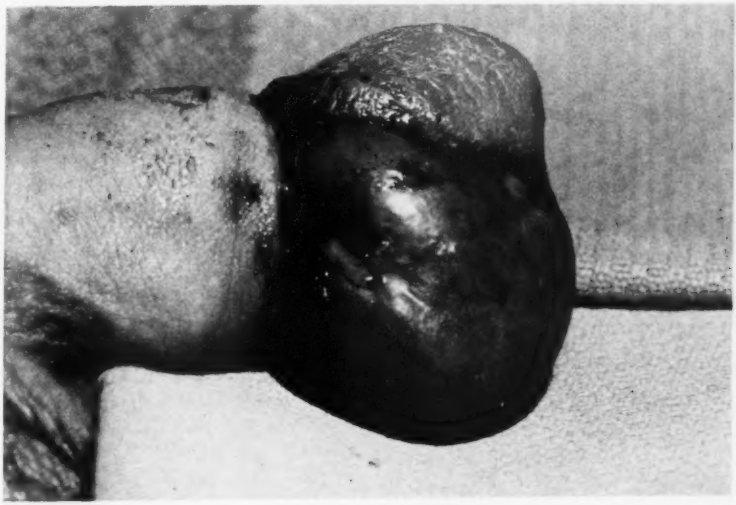


Figure 1. Phimosis of 5 days' duration with ulceration of the constricting band.

Because this method gave such uniformly good results, we recommend its use in all cases of paraphimosis which cannot be easily and painlessly reduced.

SUMMARY

Paraphimosis, if not adequately treated soon after it occurs, may produce a prolonged morbidity. In its early stages, it can be successfully treated by manually reducing the foreskin. When it has progressed to marked edema, ulceration or gangrene, and infection, operative intervention is required.

If a dorsal slit of the constricting band is allowed to heal before a circumcision is performed, an inordinately long morbidity may result. Thirteen patients with paraphimosis requiring operative intervention were treated by performing an immediate circumcision. With prophylactic antibiotic therapy the wound healed rapidly and morbidity was markedly reduced.

Immediate circumcision is recommended as a replacement for the dorsal slit procedure in the treatment of paraphimosis, when manual reduction of the foreskin is impossible.

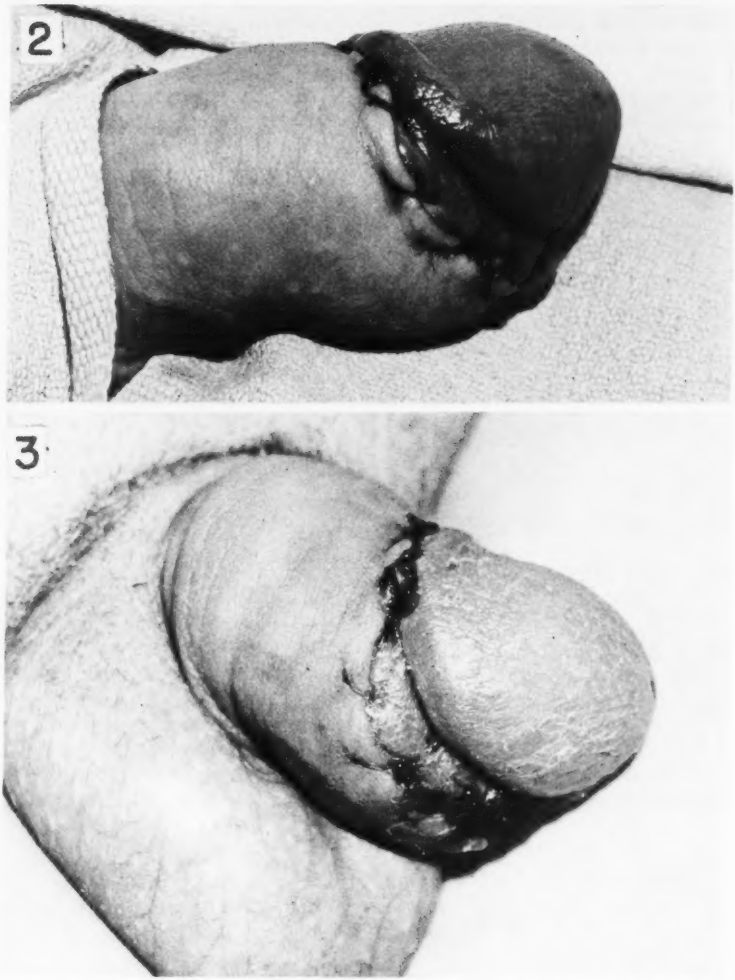


Figure 2. Immediate postoperative appearance. Figure 3. Appearance on the fourth postoperative day. There is no evidence of inflammation.

REFERENCES

1. Campbell, M.: *Clinical Pediatric Urology.* W. B. Saunders Co., Philadelphia, Pa., 1951. pp. 957-959.

2. McCrea, L. E.: *Clinical Urology.* 2d edition. F. A. Davis Co., Philadelphia, Pa., 1948. pp. 99-100.

3. Rolnick, H. C.: *The Practice of Urology.* J. B. Lippincott Co., Philadelphia, Pa., 1949. Vol. 1, pp. 198-199.

4. Winsbury-White, H. P. (editor): *Textbook of Genito-Urinary Surgery.* Williams & Wilkins Co., Baltimore, Md., 1948. pp. 603-604.

5. Taylor, H. B.: Immediate circumcision for infected phimosis; report of 42 cases. *J. Urol.* 52: 615-619, Dec. 1944.

CHLORPROMAZINE JAUNDICE

ROBERTO E. BENITEZ, *Lieutenant Colonel, MC, USA*
THEODORE A. KIERSCH, *Lieutenant Colonel, MC, USA*
JOSEPH CASTAGNO, *Lieutenant Colonel, MC, USA*
EDWIN M. GOYETTE, *Colonel, MC, USA*

CHLORPROMAZINE, one of the recently discovered tranquilizing drugs, is in widespread use, especially for psychiatric patients. It has been used in Europe since 1951 and in America since 1954. The evidence gathered to date seems to indicate that these drugs will prove most useful in those patients for whom barbiturates were found to be effective in the past, and especially in outpatients.

An obstructive type of jaundice caused by this drug has been reported with increasing frequency in the recent literature. Clinically, it is important to distinguish this type of jaundice from others of obstructive type, as the condition may be erroneously attributed to some cause amenable to surgery and an unnecessary operation performed. In the following case the diagnosis was made clinically and confirmed by liver biopsy.

CASE REPORT

A 28-year-old white enlisted man with 10 years' service was hospitalized from 22 October to 2 November 1955 for depressive symptoms after two months in Germany. The history as obtained from his wife indicated that he "acted childlike, just as a small boy would act." He had financial difficulties with his mother, who demanded support from him. The patient was discharged on 2 November on a social service follow-up basis, and on this day he was started on 25 mg of Thorazine (brand of chlorpromazine) three times per day. Depression recurred, with anxiety and lack of confidence, and he complained about failing his wife and children, inadequacy, and an inability to "face things." On 17 November he took 3 Thorazine tablets, 1 aspirin, and 2 teaspoons of elixir of phenobarbital sodium. He told his wife, who took him to the dispensary. Because of language difficulty (the wife is Japanese), the German doctor sent the patient to a hospital as an attempted suicide.

Physical and neurologic examination was essentially negative. The patient appeared depressed, looked away, and was passively uncooperative. He talked little and sighed often. His thoughts were poorly

From U. S. Army Hospital, Frankfurt, APO 757, New York, N. Y.

organized but not dissociated. There were no delusions or hallucinations, and affect was generally appropriate.

Laboratory studies on 18 November showed a hemoglobin of 14.8 g/100 ml and a white blood cell count of 6,500/μl, with 59 per cent neutrophils, 25 per cent lymphocytes, 15 per cent eosinophils, and 1 per cent basophils. The serologic test for syphilis was negative, and the heterophile antibody titer was normal. Total cholesterol was 350 mg/100 ml; esters, 68 per cent of total. Liver function tests are shown in table 1. On 16 December the prothrombin time was 90 per cent of normal, and on 6 January 1956 a roentgenogram of the abdomen was negative.

On 25 January hematocrit was 46 ml/100 ml; hemoglobin, 15.8 g/100 ml; red blood cell count, 6,040,000/μl; and white blood cell count, 5,200/μl, with 55 per cent neutrophils, 41 per cent lymphocytes, 2 per cent monocytes, and 2 per cent eosinophils. Bleeding time was 2½ minutes; coagulation time, 12½ minutes; and sedimentation rate, 25.

The patient was placed on a closed ward and given a regular diet and 0.2 gram of Amytal Sodium (brand of amobarbital sodium) before bedtime. The day after admission he noticed severe generalized itching, and the following day his stools were light colored. His appetite was poor the first week, and he was depressed and unsociable. He lost some weight after admission and appeared lethargic and disinterested. On 28 November he was placed on 0.75 mg of Serpasil (brand of reserpine) twice a day and moved to an open ward.

On 5 December scleral icterus was first noticed. The patient then stated that his urine had been dark since 10 November. Examination on 5 December revealed moderate icterus of the sclerae and skin, multiple excoriations of the skin due to scratching, and nontender enlargement of the liver two fingersbreadth below the right costal margin. All medication was stopped, and he was placed at modified bed rest on a high-protein, high-carbohydrate, low-fat diet supplemented with hexavitamins. On 14 and 15 December he had diarrhea, five to six stools each day. There was little change in icterus and itching during the following six weeks, and on 26 January, biopsy of a specimen of the liver was performed.

The gross specimen was a threadlike fragment of mottled greenish tan tissue approximately 3.5 cm in length. Microscopic examination revealed liver tissue in which the architecture was essentially unchanged. There was marked plugging of the biliary canaliculi by green bile thrombi, usually in the central portion of the lobules (fig. 1), and bile pigment in Kupffer's cells. The portal areas were not unusual. A few showed a sparse sprinkling with mononuclear cells. The bile ducts showed no dilatation or plugging. Within the lobules some individual cells showed degenerative changes with an orange or hyalin-like cytoplasm and pyknotic nuclei. In areas there was a slight variation in the

TABLE 1. *Summary of liver function tests in patient with chlorpromazine jaundice*

	6 Dec	8 Dec	16 Dec	23 Dec	30 Dec	7 Jan	10 Jan	17 Jan	23 Jan
Serum bilirubin (mg/100 ml)									
Direct	2.49	2.15	2.15	2.30	2.49		1.84	2.03	2.42
Indirect	2.65	2.99	2.15	2.50	3.19		2.76	2.11	2.72
Total	5.14	5.14	4.30	4.80	5.68		4.60	4.14	5.14
Cephalin-cholesterol flocculation (units)									
24 hours		0	+	tr	2+	2+	tr	neg	
48 hours		0	+	tr	3+	3+	tr	tr	
Thymol turbidity (units)	2.6	2.4	8.0	2.6	2.0		2.0	2.8	2.0
Urine									
Bile	+	+	+	+	tr		0	+	tr
Urobilinogen	0	0	0	0	0		1:2	0	0
Serum alkaline phosphatase (Bodansky units)		12.7	14.1	16.8	12.74		15.1		16.4
Serum protein (g/100 ml)									
Albumin		4.05							
Globulin		3.25							
Total		7.30							

size and shape of the cells and nuclei. Bizarre multiple nuclei could be found in some cells (fig. 2). A few, usually single, eosinophils could be seen.

These changes were interpreted as intrahepatic bile stasis compatible with so-called "chlorpromazine jaundice." The degenerative and regenerative changes suggested some degree of liver damage. However, it could not be determined histologically whether this occurred before or after Thorazine therapy.

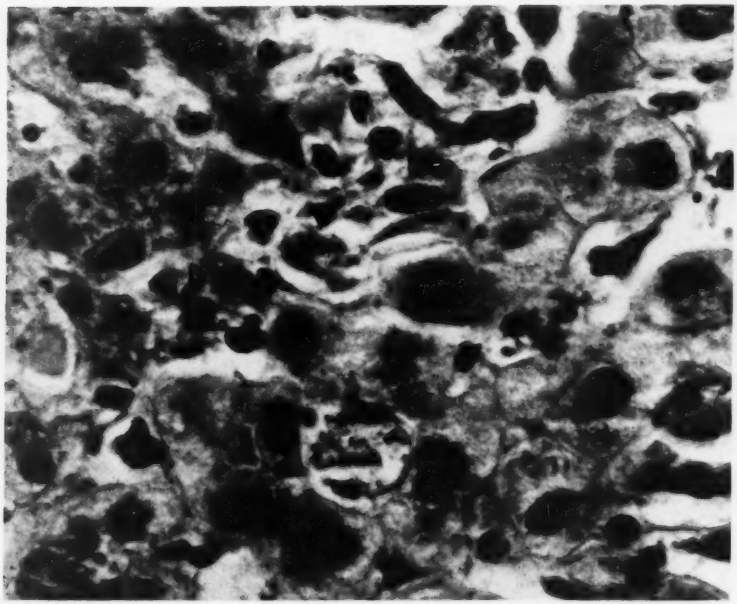


Figure 1. Central area of liver showing bile plugging of canaliculi and bile pigment in Kupffer's cells. (Hematoxylin-eosin stain, × 500)

Further questioning of the patient failed to elicit any history of previous hepatitis or liver disease. When evacuated to the zone of the interior three months after onset, he was still jaundiced. The pruritus had diminished slightly in intensity since admission, and the total serum bilirubin was still elevated. The only follow-up we have in this case is a letter from the patient dated six weeks after evacuation in which he indicated he was feeling well, the jaundice was "almost clear," and the laboratory tests "almost normal."

Figure 2. Section of liver showing slight cellular edema, nuclear pleomorphism, hyperchromatism, and a multinucleated cell in the center of the field. (Hematoxylin-eosin stain, × 500)

DISCUSSION

The general consensus of opinion is that jaundice constitutes an infrequent complication of chlorpromazine therapy. Various reports show an incidence varying from 1 to 5 per cent.[1-3] Zutt[4] stated that Megaphen (brand of chlorpromazine) has been used at the Frankfurt University Nervenklinik in about a thousand cases without a single case of jaundice occurring. Generally, European authors report a lower percentage of jaundice as a complication of chlorpromazine therapy. This aroused our curiosity and led us to believe that possibly there were some differences between various brands of chlorpromazine. However, on inquiring locally, we found that Megaphen, Largactil, and Thorazine are in fact all identical. The largest single series of cases in current psychiatric literature reporting complications in chlorpromazine therapy was a recent report by Denber and Bird.[5] In this series of 1,300 cases there were 18 cases (1.3 per cent) of jaundice reported; 8 developed within the first month of treatment with Thorazine, 9 within the second, and 1 in the third. After withdrawal of the drug, 15 of these 18 cases cleared in 7 days. Of the remaining 3 patients, 2 were suspected of having gallbladder disease; cholelithiasis

was found at operation in one of these two. The jaundice apparently cleared in the other after 12 weeks.

There are other complications in chlorpromazine therapy that occur with greater frequency than jaundice, especially when large doses are given over a prolonged period of time. In the series mentioned above, a Parkinson-like syndrome occurred in 85 cases (6.5 per cent) and a skin rash in 54 cases (4 per cent). Both of these complications also responded either to discontinuation of the drug or to appropriate specific therapy. Other possible complications are lowering of blood pressure to dangerous levels and hyperpyrexia.

The clinical features of chlorpromazine jaundice are usually as follows:

1. It more commonly follows oral rather than parenteral administration. Onset usually occurs a week or more after treatment, in some cases from one day to two weeks after withdrawal. One exception was Sussman and Sumner's[6] case, in which pruritus and jaundice appeared 2 and 12 days, respectively, after a single dose of 50 mg of Thorazine.

2. Grippelike symptoms with fever may occur.

3. Abdominal distress, usually without actual pain, and change in bowel habits may occur at the onset.

4. Occasionally there is nausea and vomiting.

5. Jaundice appears several days later, frequently accompanied by pruritus, dark urine, and clay-colored stools.

6. The liver may be tender.

7. The patient is seldom seriously ill.

8. The jaundice lasts about three weeks. In some cases it has persisted longer. Azima and Ogle[7] reported one case where jaundice was still present seven months after onset.

9. Biochemical tests suggest obstructive jaundice.

10. Eosinophilia is seen in some cases. Hartnett[8] reported one case with 58 per cent eosinophils at one time.

11. Biopsy of the liver usually shows centrilobular bile stasis with or without inflammatory reaction. Some pathologists[9] use this finding in differentiation from extrahepatic obstruction, with the note of caution that this is not foolproof. Others, like Watson,[10] believe that the lesions seen in cholangiolitic hepatitis and jaundice due to arsphenamine, methyltestosterone, or chlorpromazine are not distinctive.

12. There is no residual hepatic damage after recovery. The last statement may be too optimistic. There are reports, such as that of Hartnett's case, in which there was evidence of residual liver damage (excess urobilinogen in the urine) six months after recovery. Some reports[11] point out that jaundice might be precipitated in patients with impaired liver function. It is also of interest that patients with previous liver disease show an increased responsiveness to chlorpromazine.[12]

Several fatal cases have been reported recently. Deschamps'[13] case was a seriously ill patient who died on the fourth day of therapy for delirium tremens. However, he had severe cirrhosis of the liver. Boardman[14] described "toxic hepatitis" in his case. However, at the time there were three other cases in the hospital with infectious hepatitis. Tasker[15] reported a death in a patient who first exhibited jaundice and in whom the drug was continued until agranulocytosis developed before death. Hodges'[16] patient also developed agranulocytosis before death. It differed in that only one 10-mg dose was given intramuscularly after an exploratory operation for jaundice. The patient had previously received 25 mg of chlorpromazine twice daily for 21 days. Agranulocytosis appeared a few days after operation. Seventeen fatal cases in 45 patients developing blood dyscrasias after the administration of chlorpromazine have been reported.[17]

The liver injury produced by chlorpromazine is similar to that caused by arsphenamine, thiouracil, methyltestosterone, and dinitrophenol. The various theories advanced to explain the changes favor the idea of direct toxic damage to cells. As a result of alterations in the cell membranes there is interference with hydration of the bile. Some authors[18] point to the edema of the central cells to explain the plugging of the canaliculi in this area, while the most peripheral areas are free of changes. This observation may explain why, in cases where a T tube is placed in the common duct, the bile drained is normal in volume and viscosity, since the bile secreted by the peripheral portion of the lobule is excreted without impediment.

There is much speculation as to whether the drug acts as a hepatotoxin or whether it is a matter of drug sensitization. In support of the latter theory is the delay in onset and the occurrence of granulocytopenia, agranulocytosis, and dermatitis in some cases. Dermatitis occurring in 13 of 425 nurses and 1 of 6 pharmacists handling chlorpromazine is reported.[19] Accelerated reactions have been explained on the basis of cross sensitivity, and it is pointed out[6] that chlorpromazine is closely related chemically to some commonly used antihistamines such as phenergan, which is a derivative of phenothiazine. Most authors emphasized that in several cases no jaundice had been observed on a second

trial with the drug. However, Sussman and Sumner's patient was given 38 mg of the drug orally seven months later. No jaundice appeared, but the patient had epigastric distress, nausea, and vomiting two hours later. The liver function tests were repeated and showed an elevation in the serum bilirubin and alkaline phosphatase.

In the management of this disorder a high caloric diet with added vitamins is recommended. Activity is restricted and the drug discontinued. Steroids are said to be of no value. Hydrocholeretic agents are suggested by some authors. A brief trial of corticotropin (ACTH) was ineffective in this case. The dosage of ACTH given was 25 mg intramuscularly, daily for one week. It is realized that this dose was too small to be considered an adequate clinical trial. However, we were wary lest the patient's psychosis be aggravated by the hormone.

To date, we have given Thorazine in varying doses to over 100 psychiatric patients. This is our first case of jaundice. Possible complications with any therapy must always be watched for; however, the possibility of this complication as yet does not preclude the further use of chlorpromazine in psychiatric patients.

SUMMARY

A case of jaundice following administration of chlorpromazine is presented. Some of the clinical and pathologic features of this disease are discussed. The diagnosis can be made with a good history, appropriate liver function tests, and biopsy of a specimen of the liver or cholangiography, and an unnecessary operation may be avoided.

REFERENCES

1. McHardy, G.; McHardy, R.; and Canale S.: Chlorpromazine (thorazine) hepatitis. *Gastroenterology* 29: 184-188, Aug. 1955.

2. Stacey, C. H.; Azima, H.; Huestis, D. W.; Howlett, J. G.; and Hoffman, M.M.: Jaundice occurring during administration of chlorpromazine. *Canad. M. A. J.* 73: 386-392, Sept. 1, 1955.

3. Movitt, E. R.; Meyer, M. A.; Snell, A. M.; Goldman, M. J.; Gibson, J. R.; Sullivan, B. H., Jr.; Webster, J. G.; and Stone, R. B.: Jaundice associated with administration of chlorpromazine, SKF-2601-A (thorazine); report of three cases with biopsies of liver. *Gastroenterology* 28: 901-913, June 1955.

4. Zutt, J.: Personal communication.

5. Denber, H. C. B., and Bird, E. G.: Chlorpromazine in treatment of mental illness; side effects and relapse rates. *Am. J. Psychiat.* 112: 465, Dec. 1955.

6. Sussman, R. M., and Sumner, P.: Jaundice following administration of 50 mg of chlorpromazine. *New England J. Med.* 253: 499-502, Sept. 22, 1955.

7. Azima, H., and Ogle, W.: Effects of largactil in mental syndromes. *Canad. M. A. J.* 71: 116-121, Aug. 1954.

8. Hartnett, B. S.: Liver damage and eosinophilia following chlorpromazine therapy; report of case. *Brit. M. J.* 1: 1458-1459, June 18, 1955.

9. Castleman, B.: In discussion. Case records of Massachusetts General Hospital, weekly clinicopathological exercises. *New England J. Med.* 253: 379-383, Sept. 1, 1955.

10. Watson, C. J.: In discussion of preceding presentations and general remarks. Presented at fifth annual meeting of Association for Study of Liver Diseases, Chicago, Ill., Oct. 28, 1954. (Research Society Abstracts section) *Am. J. Med.* 19: 641-643, Oct. 1955.

11. Winkelman, N. W.: Chlorpromazine in treatment of neuropsychiatric disorders. *J. A. M. A.* 155: 18-21, May 1, 1954.

12. Moyer, J. H.; Kent, B.; Knight, R.; Morris, G.; Huggins, R.; and Handley, C. A.: Laboratory and clinical observations on chlorpromazine (SKF-2601-A)-hemodynamic and toxicological studies. *Am. J. M. Sc.* 227: 283-290, Mar. 1954.

13. Deschamps A.: Hibernation artificielle en psychiatrie. *Presse med.* 60: 944-946, June 21, 1952. Cited in Loftus, L. R.; Huizenga, K. A.; Stauffer, M. H.; Rome, H. P.; and Cain, J. C.: Jaundice caused by chlorpromazine (thorazine). *J. A. M. A.* 157: 1286-1288, Apr. 9, 1955.

14. Boardman, R. H.: Fatal case of toxic hepatitis implicating chlorpromazine. *Brit. M. J.* 2: 579, Sept. 4, 1954.

15. Tasker, J. R.: Fatal agranulocytosis during treatment with chlorpromazine. *Brit. M. J.* 1: 950-951, Apr. 16, 1955.

16. Hodges, H. H., and LaZerte, G. D.: Jaundice and agranulocytosis with fatality following chlorpromazine therapy. *J. A. M. A.* 158: 114-116, May 14, 1955.

17. Council on Pharmacy and Chemistry: Blood dyscrasias associated with chlorpromazine therapy. *J. A. M. A.* 160: 287, Jan. 28, 1956.

18. Lindsay, S., and Skahen, R.: Jaundice during chlorpromazine (thorazine) therapy; histologic study of hepatic lesions in five patients. *A. M. A. Arch Path.* 61: 84-90, Jan. 1956.

19. Chlorpromazine dermatitis. (Foreign Letters section) *J. A. M. A.* 160: 74, Jan. 7, 1956.

TRANQUILIZING DRUGS AND THE COMMUNITY

"There are serious social implications, we think in the widespread administration of Reserpine, Chlorpromazine and the other tranquilizers. Relaxation, within limits, is all very well; but it can be carried to a point at which individuals are removed from participation in society, or at least made less aware than they ought to be of their surroundings. A community, most members of which were rendered wholly free from worry and tension, could become a complacent community readily susceptible to the manipulation of a dictator. Opium smoking relieves anxiety, too. But it removes the smoker from reality. People who mean to be self-governing need to beware of too much tranquilization."

—EDITORIAL
in *The Washington Post and Times Herald*
Dec. 3, 1956

416757 O - 57 - 5

IMPORTANCE OF FLEXION IN CERVICAL TRACTION FOR RADICULITIS

BENJAMIN L. CRUE, Jr., *Lieutenant Commander, MC, USN*

HELPING the patient to obtain relief from pain in cervical radiculitis often seems a very difficult task. Cervical traction is one of the main forms of conservative treatment. However, if this traction is used incorrectly, the patient often gains no benefit, but may indeed be made more uncomfortable. In this syndrome the neck should be kept in flexion and not allowed to hyperextend.

The use of traction has long been a standard adjunct in the conservative management of the syndrome of herniations of the nucleus pulposus, both lumbar and cervical, by the orthopedist and the neurosurgeon. The routine use of bilateral leg traction for patients with lumbar disks has gradually been discarded in favor of earlier laminectomy, but the use of cervical traction seems ever to grow in popularity. Every physician has his own preference of halter type, weight, time schedule, length of trial, and concurrent use of physiotherapy, neck brace, or collar.[1] In the majority of conditions for which cervical traction is used, almost any type of traction can be expected to give some degree of relief. In the tension syndromes, originally largely psychogenic, and even in the true organic cervical sprains and whiplash injuries, many types of traction will give varying relief. Often a trial-and-error method must be used. This is not true in cervical disk disease.

The literature contains many articles which discuss in detail cervical fractures or dislocations. There has been much less written concerning the technic of traction in the less acute or less severe conditions. Most head halters for cervical traction are constructed with a strap under the chin and a second strap behind the occiput. The straps may be of equal size, or the occipital strap may be smaller, mainly used to keep the larger strap under the chin from sliding forward. In either case, if traction is applied in a straight line with the long axis of the body, most of the force is applied by the strap under the chin. This is especially true when overhead traction is applied with a heavy pull for a short

From U. S. Naval Hospital, Chelsea, Mass.

time, with the patient in a sitting position. This pull under the chin almost invariably leads to a considerable degree of extension of the neck. It should cause little wonder that this type of traction may result in little or no improvement, and may intensify the pain in those patients with true radiculitis resulting from encroachment on the foramens. One of the diagnostic signs of cervical radiculitis is radiating pain on hyperextension of the neck. Extreme flexion of the neck may also cause local pain due to tightness, but usually causes no radicular pain.

In the syndrome of herniated cervical disk there are two distinctly different general groups of cases. The acutely herniated nucleus pulposus, either protruded or extruded, with compression or irritation of a single nerve root, occurs in the cervical as well as in the lumbar area. If there are definite neurological signs of compression, prompt surgery is the treatment of choice for the herniated cervical disk. However, in the early or minimal case, or in the patient for whom surgery is otherwise contraindicated, cervical traction remains a factor in the conservative management.

This still leaves a large second group of patients with the so-called "hard disk" or "spurs" at the foramens. These patients are usually in the older age group. There is usually some degree of associated osteoarthritic change in the cervical spine. Often more than one root level is involved, and often the condition is bilateral. The usual picture is one of chronic recurrent radicular irritation with pain, but with only minimal neurologic evidence of nerve root compression. At times the disease may progress to the point where radical type surgery is necessary, but most observers agree that with the present surgical technics, all attempts at conservative management should be exhausted first.

In the past five years the author has treated over twenty such patients with cervical disk syndromes for whom surgical intervention was not considered advisable. In the majority of these cases, cervical traction had previously been tried and either gave no significant relief or caused an exacerbation of radicular pain. With only one exception, all these patients obtained moderate to complete relief by reinstituting cervical traction, often over the patient's protest, and by flexing the neck 20° to 30°.

It is interesting to speculate why such neck flexion is of benefit. Examination of the cervical skeleton reveals that the spinal foramens are anterior to the midline of the spinal canal. But the fulcrum is not at the facets. The articulating surfaces slide upon one another, the most fixed point being anterior at the vertebral body. Thus, on flexing the cervical spine, the long diameters of the foramens should be increased and thus cause an over-all enlargement. That this is so can easily be demonstrated by roentgenography. The following roentgenograms are illustrative.

Figure 1 shows the roentgenographic appearance of the C5-C6 foramen in an oblique view in a 31-year-old normal control with the neck in about ten degrees of extension with no traction. The

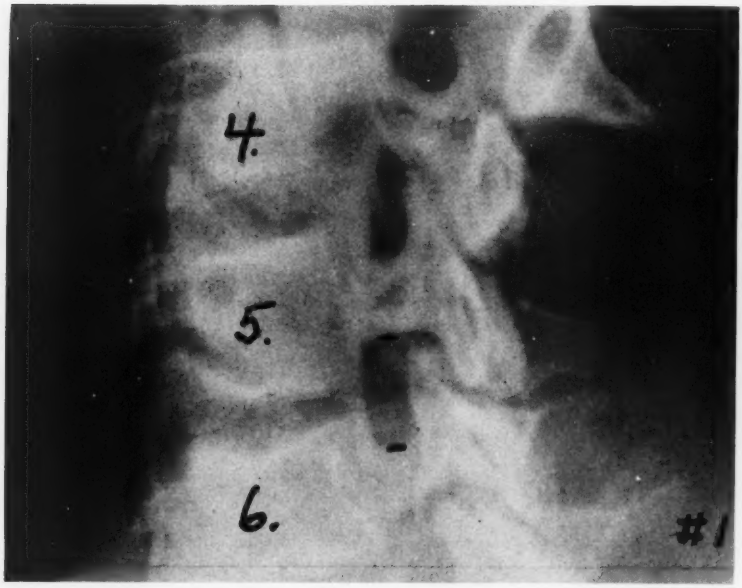


Figure 1. Roentgenogram (oblique view) showing C5-C6 foramen of 11.5 mm in length when the neck is extended 10° with no traction.

foramen measures 11.5 mm in the longitudinal axis. Without changing any factors except flexing the neck approximately twenty degrees, the foramen (fig. 2) now measures 13 mm. Figures 3and 4 are similar oblique views of the C5-C6 foramen in a 35-year-old master sergeant, on active duty in the U. S. Army, who had severe chronic cervical radiculitis with recurrent bilateral radicular pain for over nine years. Most of the pain had radiated into the thumbs and index fingers. Neurologic examination revealed no atrophy, no weakness, no reflex change, and only minimal hypalgesia to pinprick over the C6 distribution on the right side. There were no long tract signs. Poentgenograms revealed arthritic changes in many of the cervical vertebra with narrowing of the C5-C6 interspace. The oblique views showed typical spurring at several of the foramens (fig. 3). A myelogram revealed bilateral root cuff defects at C6, smaller cuff defects of C5 and C7 on the right, and midline bars at C4-C5 and C5-C6. Electromyography on the right revealed minimal lower motor neuron changes in the distribution of the C5, C6, and C7 roots. Hyperextension of the neck to 10° caused pain in both C6 root distributions. Figure 3 was taken

with the neck extended, and the C5-C6 foramen measured 8 mm. Figure 4 was then taken with the neck flexed 20°, and the foramen measured 10 mm. The patient was placed in cervical traction of 5 pounds with the neck flexed 20°, and the radicular pain subsided markedly within 24 hours.

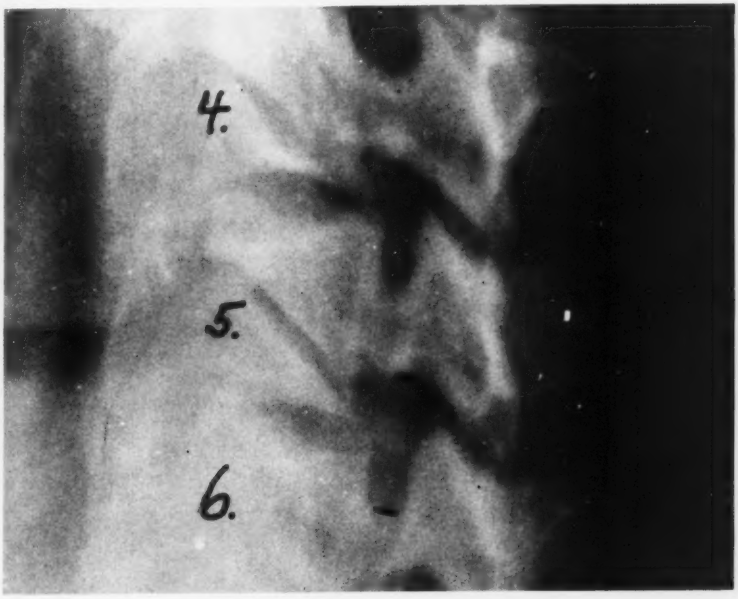


Figure 2. Roentgenogram (oblique view) of same person as in figure 1 except that the neck has been flexed about 20°. The foramen now measures 13 mm.

There are many ways to obtain neck flexion while in cervical traction. I prefer to use a head halter with equal straps. Then the pulley at the head of the bed is raised so that with the patient lying on his back the cord forms an angle of at least 45° (fig 5). This puts the largest vector of force into the strap behind the occiput and flexes the neck. The head is supported on a pillow or folded sheets. The patient is told that he should feel most of the pull at the occiput. If there is much pull under the chin, the apparatus should be rechecked. Occasionally a sponge-rubber pad is used over the occiput to prevent pressure over the greater occipital nerves. Usually no pad is needed under the chin. A small weight (5 lb for women and small men, 7 lb for heavy males) over a longer period of time is preferred. Most patients soon obtain benefit from the traction and wear it gladly, and with no severe pull on the chin strap, they learn to sleep in the harness. Patients are usually allowed out of traction to eat, go to the

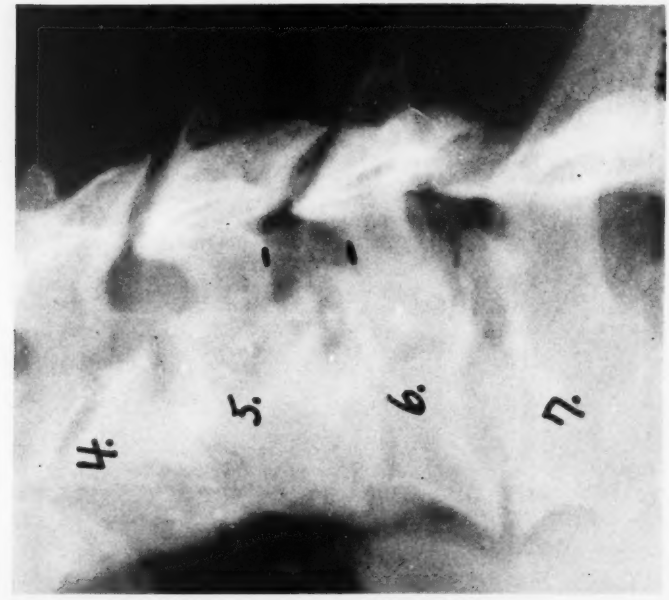


Figure 4. Roentgenogram (oblique view) of same patient as in figure 3 except that the neck has been flexed 20°. The foramen now measures 10 mm.

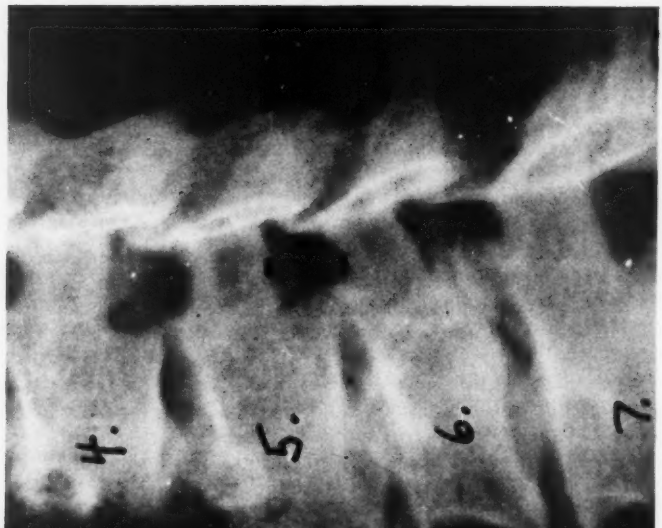


Figure 3. Roentgenogram (oblique view) showing spurring at several of the cervical foramens and a C5-C6 foramen measuring 8 mm when the neck is hyperextended.

bathroom, or whenever the apparatus upsets them. If the pain is unilateral, turning the head slightly, usually away from the afflicted side, may increase the comfort obtained.

This traction technic is not original and is not presented as a "cure-all." Many patients have residual aches that do not subside or find that they need to continue the traction even after the acute episode of radiculitis subsides. Others find that as soon as they are ambulatory their attacks recur. It is believed, however,

Figure 5. Photograph showing traction apparatus arranged so that the cord forms as angle of about 45° at the pulley.

that this type of cervical traction is superior to the usual traction in the long axis of the body in patients with true cervical radiculitis. This type traction with flexion has not been used, of course, in patients with large mid-line lesions and signs of spinal cord involvement.

SUMMARY

Cervical traction is an important part of the conservative management of those patients with cervical radiculitis for whom surgery is not indicated. The usual methods of cervical traction, with the patient either sitting or in bed and with the pull in line

with the long axis of the body, tend to cause neck extension and are not suitable in cervical radicular syndromes. Cervical traction with approximately twenty degrees of neck flexion seems to offer better results in this condition. This type of traction can easily be obtained with the patient lying in the supine position by merely raising the pulley on the usual traction apparatus.

REFERENCE

1. Scuderi, C.: *Atlas of Orthopedic Traction Procedures.* C. V. Mosby Co., St. Louis, Mo., 1954. pp. 48-69.

ETHICS AND THE SCIENTIFIC MS.

"There are certain ethical considerations which are generally recognized among scientists. One of the most important is that, in reporting an investigation, the author is under an obligation to give due credit to previous work which he has drawn upon and to anyone who has assisted materially in the investigation. This elementary unwritten rule is not always followed as scrupulously as it should be and offenders ought to realize that increased credit in the eyes of the less informed readers is more than offset by the opprobrium accorded them by the few who know and whose opinion really matters. A common minor infringement that one hears is someone quoting another's ideas in conversation as though they were his own."

—W. I. B. BEVERIDGE
The Art of Scientific Investigation
W. W. Norton & Co., New York, N. Y.
1950, pp. 140-141

Clinicopathologic Conference

U. S. Army Hospital, Frankfurt, APO 757, New York, N. Y.*

LYMPHADENOPATHY AND FEVER

Summary of Clinical History. A five-month-old white male infant was admitted to the hospital with initial symptoms of fever, lymphadenopathy, and irritability. He was born in Germany by a normal delivery; his birth weight was 7 lb, 11 oz. In the first weeks of life he had thrush and was treated with gentian violet. He gained weight steadily on breast feedings and remained well until the onset of his present illness. The parents and one sister, aged four, were living and well. The sister was stated to have had a calcified area in her chest, but a roentgenogram of her chest showed no calcification, and one of the mother's chest revealed normal findings. There was no tuberculosis, syphilis, rheumatic fever, allergic diseases, or diabetes in the family.

First Hospitalization. When the patient was four and one-half months old his mother noticed that he was irritable and feverish. He was examined by a physician, but no cause for the illness was found, and no treatment was given. His temperature continued as high as 105°F, and he was admitted to a hospital 10 days after onset of the illness.

Physical examination revealed cervical, slight axillary, and moderate inguinal lymphadenopathy. Except for a hot, dry skin

*Col. F. Y. Leaver, MC, USA, Commanding Officer. From the Laboratory Service, Lt. Col. Roberto E. Benitez, MC, USA, Chief.

and a temperature of 104°F, physical findings were not otherwise remarkable.

The red blood cells numbered 3,400,000/μl, and the hemoglobin was 8.8 g/100 ml. The white blood cell count was 52,850/μl, with 54 per cent lymphocytes, 2 per cent monocytes, 1 per cent eosinophils, and 43 per cent neutrophils. Repeated blood studies were essentially the same, except that the red blood cell count fell to 2,500,000/μl. The urine was normal. Spinal puncture revealed clear spinal fluid with 31 cells (29 lymphocytes)/μl; sugar was 74 mg/100 ml. Roentgenograms of the chest revealed normal findings.

On admission, 7.83 mg (12,500 units) of potassium penicillin G every three hours and 0.12 gram of sulfadiazine every three hours were started. The patient was hydrated, and an attempt was made to control his temperature with baths and aspirin. Nevertheless, the temperature ranged from 101° to 105°F.

Second Hospitalization. After three days, the patient was transferred to this hospital, where it was noted that the liver was palpable four fingersbreadth below the costal margin. Other physical findings included moist rales throughout both lung fields, some generalized lymphadenopathy, and marked pallor. The spleen was not felt.

Roentgenograms of the chest showed lobular prominence of the right hilar root consistent with lymphadenopathy; those of the abdomen showed a large, soft-tissue tumor mass filling the left side from the subdiaphragmatic area to the iliac crest, probably representing an enlarged spleen or kidney. The skull and long bones appeared normal on roentgenograms.

Therapy, consisting of 200 mg of streptomycin sulfate orally every six hours, was started; in addition, the child received 25 mg and 30 mg of streptomycin sulfate intrathecally. There was no improvement, and after four days streptomycin sulfate and penicillin were discontinued. There was no change, and 31.34 mg (50,000 units) of potassium penicillin G every three hours was started again. Blood transfusions were also given.

Blood studies showed a red blood cell count of 3,300,000/μl; hemoglobin was 10.5 g/100 ml. The white blood cell count was 50,600/μl, with 47 per cent neutrophils, 51 per cent lymphocytes, 1 per cent eosinophils, and 1 per cent basophils. A bone marrow examination revealed no evidence of leukemia. The spinal fluid had normal concentrations of sugar and protein, and produced no growth when cultured. A sickle cell preparation and smears for malaria were negative. A red cell fragility test had hemolysis beginning at 0.54 per cent and was complete at 0.28 per cent; a

control began at 0.44 per cent and was complete at 0.28 per cent. The blood nonprotein nitrogen was 26 mg/100 ml, and total serum protein was 6.4 g/100 ml. The urine was normal on analysis. One blood culture was negative. After one week the patient was evacuated to a hospital in the United States.

THIRD HOSPITALIZATION

Physical Examination. The patient was a well-developed, moderately well-nourished, acutely ill infant with a temperature of 103°F. His breathing was rapid but not labored, and he had a frequent but not paroxysmal cough. His head measured 17 inches and the fontanelle was not tense. Pupils and fundi were normal. The tonsils were large but not infected. The ears and nose were normal. Many fine rales were heard throughout the lungs bilaterally. The heart was normal. The abdomen was slightly distended and tympanitic. The spleen was large and firm, and extended halfway down to the pelvic brim. There was no cervical rigidity. There was generalized lymphadenopathy, and the epitrochlear and inguinal nodes were as large as almonds. Neurologic examination revealed no abnormalities.

Laboratory Studies. Initially, the hemoglobin was 9.4 g/100 ml and the red blood cells numbered 2,600,000/μl. White blood cells were 24,150/μl, with 79 per cent neutrophils (15 per cent stab forms), 14 per cent lymphocytes, and 7 per cent monocytes. The blood smear revealed severe hypochromia with basophilic stippling. After blood transfusions, the red blood cell count was raised to 3,650,000/μl with 1.5 per cent reticulocytes, and the hemoglobin to 10.4 g/100 ml. The white blood cell count at this time reached a high of 33,300/μl, with 76 per cent neutrophils (30 per cent stab forms), 16 per cent lymphocytes, 6 per cent monocytes, and 2 per cent eosinophils. There was marked toxic granulation of the polymorphonuclear leukocytes. Platelets numbered 850,000/μl.

Two days before death the white blood cell count dropped to 2,650/μl, with 91 per cent lymphocytes, 5 per cent neutrophils, 3 per cent eosinophils, and 1 per cent monocytes; the red blood cells to 3,550,000/μl; the hemoglobin to 9.9 g/100 ml; and platelets to 199,350/μl. A Kahn test was negative. No malarial parasites were found on blood smears. The icteric index was 10; a red cell fragility test was normal, and agglutinations for Brucella were negative. The prothrombin time was 17 seconds with a control of 13 seconds. The urine was normal except for a few red blood cells seen in one specimen. The feces contained no parasites, ova, or occult blood; culture for typhoid and dysentery organisms was negative.

The spinal fluid was slightly cloudy, contained 13 cells (90 per cent lymphocytes)/μl, and had a slight increase in globulin.

Cultures of the spinal fluid and routine and acid-fast stains of smears were negative. Throat culture showed *Micrococcus pyogenes* var. *aureus, Micrococcus pyogenes* var. *albus,* and *Streptococcus mitis.* Blood cultures were negative. First and second strength tuberculin tests were negative. Gastric washings contained no acid-fast bacilli on smear or culture and no fungi on culture. Marrow from the right iliac crest showed erythropoiesis and a shift toward myelocytes in the myeloid elements. Early roentgenograms had revealed left pulmonary hilar adenopathy, but those taken on arrival at the last hospital showed a diffuse, fine infiltrative process in both lung fields, and the hilar adenopathy was less prominent. Roentgenograms of the abdomen showed a massively enlarged spleen that extended to the wing of the ilium; the liver was questionably enlarged. Roentgenograms of the skull were normal.

Course in Hospital. Penicillin and sulfadiazine therapy was started, but it soon became apparent that these drugs were ineffective, and they were discontinued. Regardless of medication, the patient ran a high temperature for at least some part of each day throughout the entire course. He received many transfusions, which had no dramatic effect. The need for frequent transfusions indicated that blood was being either lost or destroyed, inasmuch as the reticulocyte count was high and the marrow was not hypoplastic. There was considerable productive cough, and mucus was aspirated. Cyanosis was controlled with oxygen. The spleen progressively enlarged and reached the pelvic brim about 10 days after admission. Rales were always present in the lungs. The child was given 0.5 mg of aminopterin sodium daily for seven days without any helpful effect.

Several days before death the patient developed an erythematous rash, mostly over the trunk and abdomen. In some areas it was petechial. Associated with this rash were a severe stomatitis and a generalized bleeding tendency. Vitamin K and liver extract therapy was begun. For the last three or four days prior to death the child was also jaundiced. The morning of the last day he appeared better. There was no longer bleeding from the mouth and mucous membranes. The rash had disappeared, but the jaundice and fever were still present. The spleen was smaller, and there was some regression of the lymphadenopathy. He died at 1305 hours that day, about six weeks after the onset of illness.

DISCUSSION

Doctor Knowles:* The problem is briefly that of a five-month-old infant with fever, lymphadenopathy, a marked leukocytosis, and a large mass in the left lower quadrant. This provokes an interesting differential

*Capt. John A. Knowles, Jr., MC, USA, Pediatric Ward Officer.

diagnosis encompassing most of the major groups of disease; particularly one thinks of the devastating effects of systemic infection in this age group, while being aware of the multiple complications of congenital abnormalities, of the prognostically poor neoplasms and leukemias, and of the often bizarre forms of metabolic disorders occurring in the young infant.

The protocol first relates that a "disappearing calcific lesion" was present in roentgenograms of a sibling's chest. This is difficult to explain, as the two diseases which might have first been suggested by opacities of the lung are tuberculosis and histoplasmosis, both of which typically heal in the child by calcification, rather than by fibrosis, as in the adult. We further have the findings of normal chest roentgenograms of the mother and a negative tuberculin test in the sibling. The further negative report of familial illness does not include the hemolytic diseases, and as there is a point in the case where congenital familial hemolytic anemia comes into the differential diagnosis, this might have been an important question to cover in the history.

The past history offers no clues except to state that the child was essentially well up until the onset of the present illness. The possibility that the infant's monilial infection recurred systemically is a remote one.

It may be assumed that the illness at its onset was somewhat insidious, inasmuch as a physician neither recognized it to be serious nor offered treatment. By the time he was seen by the next doctor, however, he had developed a high temperature and appreciable lymphadenopathy. The blood cell count at this time was alarming with a marked leukocytosis, but the differential is essentially normal for this age group. It was at this time that penicillin and sulfadiazine were started, but apparently before obtaining important blood cultures. This may be why a diagnosis of septicemia could not be proved later. Even without meningeal signs, a lumbar puncture was wisely performed, but the findings were essentially normal. If a diagnosis of miliary tuberculosis was considered at this time, the normal sugar and protein determinations were important negatives. Usually in the meningeal form of the disease, the sugar is decreased below 50 mg/100 ml and the protein is increased above 50 mg/100 ml.

After enthusiastic hydration, the patient was seen at the second hospital where, in addition to previous findings, moist rales were heard in the chest and hilar prominence was noted radiographically. A roentgenogram of the abdomen apparently suggested further physical examination for a mass in the left side of the abdomen. It can be emphasized here that, in examining a child's abdomen for the presence of a spleen, one starts at the iliac crest and works upward; otherwise, as in this infant, the examiner will miss tremendously enlarged spleens and tumors, especially those associated with malaria, leukemia, Wilms's tumor, and the reticuloendothelioses, to name a few.

At this time, an important negative finding of a normal skull and long bones was obtained. This helps to rule out an associated osteomyelitis, secondary to sepsis, and the "Erlenmeyer flask" bones of acute Gaucher's disease.

The attending physicians added streptomycin sulfate to the therapy and gave some of this medication intrathecally, presumably thinking of tuberculous meningitis. The spinal fluid sugar and protein, however, were normal.

Blood studies confirmed the leukocytosis with a slight increase in neutrophils. Tuberculous meningitis usually calls forth a monocytic response. Bone marrow examination failed to reveal leukemic cells as did the peripheral smears. This is strong evidence against the acute leukemias of childhood. A sickle cell preparation was also normal. It would seem unlikely that, even if this white child were of Mediterranean descent and had the possibility of having a sickling trait, his present plight could be explained by such disease. Moreover, the negative skull roentgenogram dispels this thought. Fragility tests were suggestive but were not confirmed later.

At a hospital in the United States rales were again noticed and persistently heard. This, along with the appearance of a diffuse, fine infiltrative process in the lungs, strongly suggests the presence of bronchopneumonia. However, these roentgenographic findings are often seen in the leukemias and other malignancies.

We are also told at this time that the child's fundi were negative. Again one of the reticuloendothelioses—Tay-Sachs disease, in which the cherry-red macula is found—is ruled out.

Further physical findings only confirm previous examinations, and laboratory examinations reveal that the leukocytosis shifted to younger cells of the granulocytic series. A poor prognostic sign is noted before death in the presence of marked toxic granulation of the neutrophils. We also note by the diminishing hemoglobin and increased icteric index that the red blood cells were being hemolyzed. The Kahn test and agglutinations for Brucella (and, it is assumed, for the other febrile agglutinins) were negative. If tuberculosis was still thought of, the negative first and second strength tuberculin tests should have removed reasonable doubt, as these tests are positive in approximately 92 and 99 per cent of active cases respectively. Blood cultures were again negative, but in view of the antibiotics received, it would be difficult to obtain positive results except with a tremendously overwhelming and continued bacteremia. Despite previous treatment, the throat culture revealed a variety of organisms, all cocci.

The hospital course was generally downhill. As an apparent desperate measure, aminopterin sodium was given, and probably accounts for the terminal agranulocytosis. Usually this drug is only given for

the acute leukemias, namely, the lymphogenous and myelogenous types. It does not seem to alter the course of the lymphosarcoma group.

Before summing up, I should like to state that perhaps the major problem could have been solved by a lymph node biopsy. I would also like to have had an intravenous pyelogram of this patient to more completely delineate the abdominal mass and, by so doing, help rule out a Wilms's tumor, a neuroblastoma, or other retroperitoneal mass.

The most frequent causes for splenomegaly and leukocytosis can be ruled out in this patient. (1) Mechanical causes such as rupture of the spleen may be discounted because of the length of the course and ancillary findings. (2) Infectious causes such as a septicemia resulting in a splenic abscess cannot be completely discounted. However, a bacillemia from typhoid, brucellosis, or tuberculosis usually does not call forth such a neutrophilia; a systemic fungus infection such as histoplasmosis is unlikely from the history and geography; and the protozoan infestations may likewise be excluded. (3) Hemic causes are unlikely in this patient. A hemolytic anemia is unlikely by nature of the course of the disease. Leukemia would appear to be a possibility in view of the treatment given the patient, but is unlikely unless the results of further blood or bone marrow studies were withheld from the protocol. (4) Neoplastic causes such as a diffuse lymphosarcomatosis or primary splenic neoplasm are not ruled out; however, these would not provoke the leukocytosis found in this patient unless complicated by sepsis. Metabolic diseases such as the reticuloendothelioses are either not suggested by the history of this patient or were ruled out, except a fulminating Letterer-Siwe disease. This disease, although usually associated with a neutropenia, may well have been complicated by infection which would account for the neutrophilia.

Doctor Benitez: Doctor Spellman, perhaps you desire to discuss the roentgenographic findings.

Doctor Spellman:* The lymphadenopathy or hilar enlargement noted on the chest films is apparently due to the same disease that caused the generalized lymphadenopathy. The most likely cause of the hilar adenopathy in this case would probably be tuberculosis, leukemia, or possibly Letterer-Siwe disease. The parenchymal infiltration was probably due to bronchopneumonia, as rales were heard frequently on both sides of the chest. However, the infiltration possibly could be secondary to the original disease process. I do not remember having ever seen a case of Letterer-Siwe disease associated with parenchymal infiltration. Doctor Leaver, perhaps you have some remarks relative to Letterer-Siwe disease and parenchymal infiltration.

Doctor Leaver: In October 1952 Lackey, Leaver, and Farinacci[1] described for the first time two cases of eosinophilic granuloma of the

*Col. Charles E. Spellman, MC, USA, Chief, Radiology Service.

lungs along with an additional case of eosinophilic granuloma of bone with pulmonary findings. The radiologic picture is identical with that of Letterer-Siwe disease, Hand-Schüller-Christian disease, Gaucher's disease, and other xanthomatoses, consisting of a granulomatous infiltrate of nodular character with associated localized areas of emphysema and a slightly fibrotic background. The progress of these cases is very important, as it is in this respect that the benign nature of eosinophilic granuloma is manifest as compared with the more malignant forms of the disease—that is, Letterer-Siwe disease and Hand-Schüller-Christian disease.

Dr. Knowles' diagnoses:

1. Bronchopneumonia
2. Septicemia, complicating an underlying disease, either (a) neoplastic (lymphosarcomatosis) or (b) metabolic (Letterer-Siwe disease)

Dr. Spellman's diagnoses:

1. Tuberculosis
2. Leukemia
3. Letterer-Siwe disease
4. Bronchopneumonia

PATHOLOGIC FINDINGS

Doctor Benitez: This very intriguing case was seen at this hospital in 1948 and evacuated to Walter Reed Army Hospital, where I had the opportunity to review the case and presented it originally at a clinicopathologic conference. The diagnosis entertained at this hospital was tuberculosis. At Walter Reed Army Hospital the diagnoses considered at first were histoplasmosis and leukemia. These were ruled out by various methods and finally, after a node biopsy, the true nature of the disease was determined.

At autopsy the salient features of the gross examination were as follows: The body was that of a well-developed, moderately well-nourished white male infant weighing 6,050 grams. The skin and scleras were icteric. There were palpable lymph nodes in the neck, axillas, and groin. In the thorax the visceral and parietal pleurae were loosely adherent by fibrinous adhesions at the lower lobes. One lobe showed a hemorrhagic infarction. The liver weighed 375 grams, approximately twice the normal weight, and the spleen 110 grams, approximately six times the normal. The splenic capsule was opaque over the greater curvature. The mediastinal and retroperitoneal lymph nodes were small. In the mesentery they were larger, measuring up to 1 cm in diameter. The remainder of the gross examination was sketchy, and no other findings of significance were noted.

On microscopic examination there was a striking proliferation of the reticuloendothelial elements (fig. 1). This was noted particularly in the lymph nodes, spleen, liver, pleura, and adventitia of the stomach.

The predominant cells were nonlipid-containing histiocytes, often showing active phagocytosis of red blood cells. However, in some of the mesenteric nodes some of these cells had the appearance of foam cells (fig. 2). In the serosa of the pleura and stomach, the histiocytes were present in large numbers and showed a transition to fibroblasts. The pleura was thickened, and thin interlacing collagen bundles were seen between the cells. There was also peribronchial infiltration with histiocytes, and again the same fibrosis was noted in these areas. This was also noted in the spleen, where the concentric layers of fibers and cells around the blood vessels in the malpighian corpuscles gave them

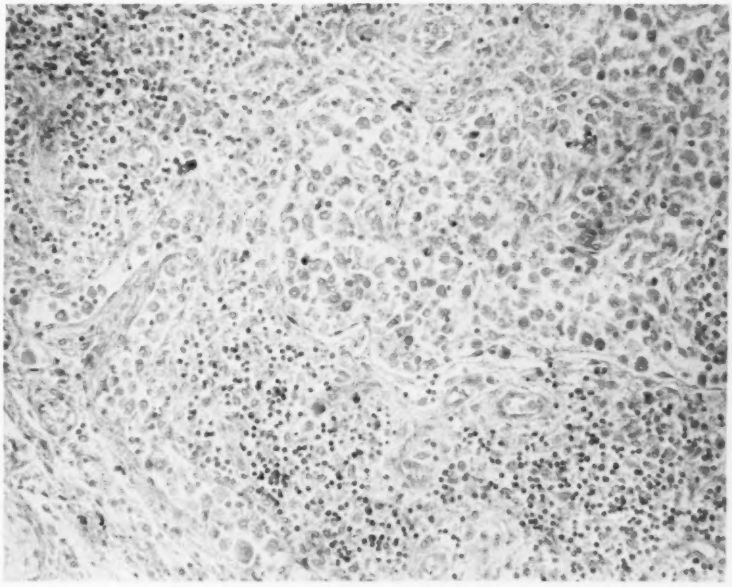


Figure 1. Lymph node showing marked proliferation of reticuloendothelial cells. These cells are pale and larger than the few lymphocytes seen in this field. (Hematoxylin-eosin stain, × 250)

a granulomatous appearance (fig. 3). The sinusoids and the red pulp of the spleen were heavily infiltrated with histiocytes. Erythrophagocytosis was marked, and considerable hemosiderin pigment was found within the cells. This was also found in the bone marrow and liver. In the latter the Kupffer's cells were prominent and laden with pigment. Many hepatic cells were also found to contain pigment. There was thickening of the leptomeninges with infiltration by histiocytes and mononuclear cells.

In many tissues, other mononuclear cells were seen in association with the reticuloendothelial proliferation. Eosinophils were seen in

416757 O - 57 - 6

small numbers in the lymph nodes and spleen. In the bone marrow, in addition to the reticuloendothelial hyperplasia, there was a marked increase in the number of eosinophils.

The intractable anemia can be explained on the basis of the marked erythrophagocytosis by the reticuloendothelial elements and the infiltration of the bone marrow. The blood destruction also explains the icterus noted clinically and the hemosiderosis noted histologically. The skin rash, petechiae, and hemorrhages are not the type of skin lesions usually described in Letterer-Siwe disease but can be attributed to the aminopterin sodium. The drop in the white blood cell count can also be attributed to this drug.

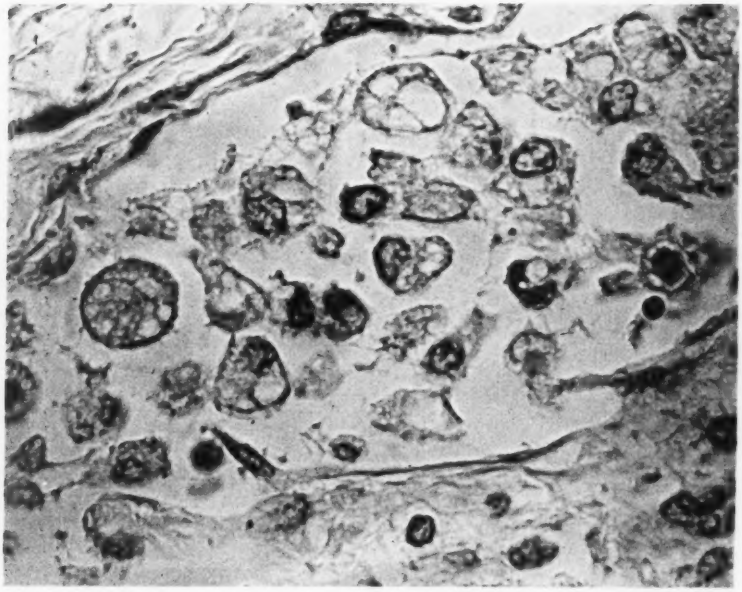


Figure 2. Mesenteric lymph node with foamy histiocytes crowded in the peripheral sinus. (Hematoxylin-eosin stain, × 500)

The entity represented by this case has been known as Letterer-Siwe disease for many years, although in the past and even today it is being reported under various names. Other terms used are "nonlipoid histiocytosis," "noninfectious reticuloendotheliosis," et cetera. The reason for disagreement on nomenclature has been the varied clinical and histologic features as well as the failure to demonstrate a causative agent.

In recent years there has been a trend to relate this disease to Hand-Schüller-Christian disease and eosinophilic granuloma of bone. The former is classically a disease of infants usually characterized by

cranial defects, exophthalmos, and diabetes insipidus. The predominant cell in the lesions is a xanthoma cell rich in cholesterol. Eosinophilic granuloma is usually a solitary bone lesion of older children and occasionally of adults. The predominant cell is the eosinophil.

From 1937 to 1940 several European[2,3] and American[4] authors pointed to the relationship between Letterer-Siwe disease and the Schüller-Christian syndrome. In 1942 Green and Farber[5] noted the relationship to eosinophilic granuloma of bone. In 1944 Jaffe and Lichtenstein[6] postulated that the various clinico-anatomic observations in these three diseases merely represent gradations in severity of the same

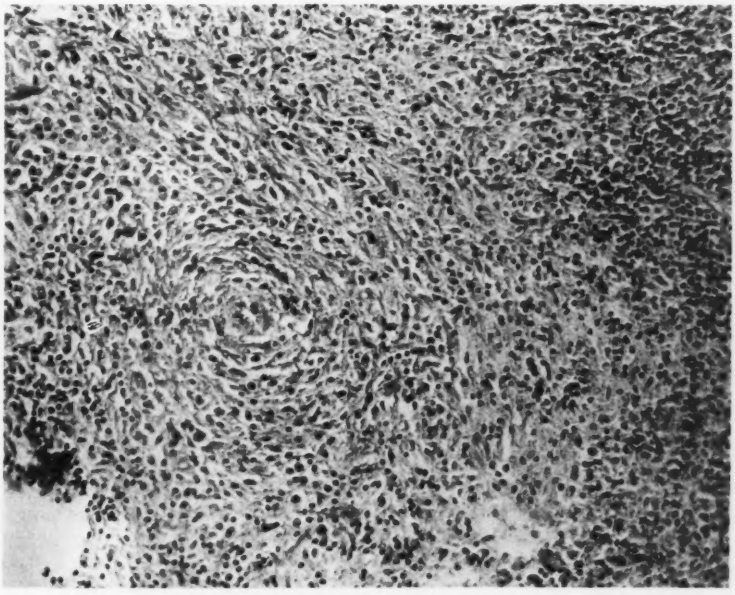


Figure 3. Fibrosis and reticuloendothelial proliferation in the spleen. (Hematoxylin-eosin stain, × 250)

disease process. Thus, on one hand Letterer-Siwe disease shows the most acute and severe manifestations; it is rapidly fatal and there is little or no lipoid deposition in the reticuloendothelial cells. The Schüller-Christian syndrome represents a chronic form of the same disease with the presence of foam cells in the lesions that have not undergone fibrosis. Thirty per cent of these patients recover. Eosinophilic granuloma represents the most benign form, with recovery usually occurring.

Lichtenstein[7] in 1953 reiterated the observations made in his first study. In this article he analyzed several recently reported cases of

these various syndromes and fit them into a pattern representing one disease, which he named "Histiocytosis X" to emphasize the basic pathologic feature and the lack of a known cause. The classification he proposed is practical from the clinical and pathologic viewpoint. All the "atypical" cases of one or the other syndromes which have appeared in the literature can be easily placed in this classification. With this unity in mind it is easy to understand the "transitions" of one clinical and pathologic feature to another—*i. e.*, an acute case of Letterer-Siwe disease going on to a chronic form of Schüller-Christian syndrome, eosinophilic granuloma presenting a chronic Schüller-Christian-like picture and terminating with an acute course similar to Letterer-Siwe disease, and various other possible combinations of clinicopathologic features.

No known cause for these three syndromes has ever been found. Infection has been considered, but attempts to demonstrate pathogenic organisms and other infectious agents have been unsuccessful. The failure of antibiotic therapy in this case and the fruitless search for a pathogen illustrate this point. A disturbance of lipid metabolism has been considered and has now been generally discarded. Trauma has been incriminated in some cases, especially in the single lesions of eosinophilic granuloma, but most cases do not present a clear-cut history of injury. Malignancy is difficult to ignore, especially in the acute cases of the Letterer-Siwe type such as the present case. Other cases have shown leukemia-like features and massive visceral infiltrations.[8] Finally, the relationship to age seems to direct attention to a possible endocrine imbalance. As Craig[8] points out, in the spectrum formed by the unified group it is noted that in the majority of cases the fatal cases "have an age at onset of less than a year. If the visceral involvement is nonfatal, the age at onset is somewhat later—a little over a year. In those with multiple bone involvement, the age at onset is three years or more . . . and, finally, when there are single bone lesions . . . the age at onset may be around eight or nine years" or even later. The occasional cases bridging the gap, such as the reported cases of Letterer-Siwe disease in adults,[9,10] are particularly thought provoking. Noteworthy in this case is the occurrence of foam cells, eosinophils, and fibrosis.

Pathologic diagnosis:
Histiocytosis X (Letterer-Siwe syndrome)

REFERENCES

1. Lackey, R. W.; Leaver, F. Y.; and Farinacci, C. J.: Eosinophilic granuloma of lung. *Radiology* 59: 504-512, Oct. 1952.

2. Flori, A. G., and Parenti, G. C.: Reticuloendoteliosi iperplasica infettiva ad evoluzione granulo-xantomatosa (tipo Hand-Schüller Christian). *Riv. di clin. pediat.* 35: 193-263, Mar. 1937.

3. Glanzmann, E.: Infektiöse Retikuloendotheliose (Abt-Letterer-Siwe'sche Krankheit) und ihre Beziehungen zum Morbus Schüller-Christian. *Arn. paediat.* 155: 1-8, Apr. 1940.

4. Wallgren A.: Systemic reticuloendothelial granuloma; nonlipoid reticuloendotheliosis and Schüller-Christian disease. *Am. J. Dis. Child.* 60: 471-500, Sept. 1940.

5. Green, W. T., and Farber, S.: "Eosinophilic or solitary granuloma" of bone. *J. Bone & Joint Surg.* 24: 499-526, July 1942.

6. Jaffe, H. L., and Lichtenstein, L.: Eosinophilic granuloma of bone; condition affecting one, several or many bones, but apparently limited to skeleton, and representing mildest clinical expression of peculiar inflammatory histiocytosis also underlying Letterer-Siwe disease and Schüller-Christian disease. *Arch. Path.* 37: 99-118, Feb. 1944.

7. Lichtenstein, L.: Histiocytosis X; integration of eosinophilic granuloma of bone, "Letterer-Siwe disease," and "Schüller-Christian disease" as related manifestations of single nosologic entity. *A. M. A. Arch Path.* 56: 84-102, July 1953.

8. Craig, J. M.: In discussion. Case records of Massachusetts General Hospital; weekly clinicopathological exercises. *New England J. Med.* 252: 630-634, Apr. 14, 1955.

9. Dennis, J. W., and Rosahn, P. D.: Primary reticuloendothelial granulomas with report of atypical case of Letterer-Siwe disease. Am. *J. Path.* 27: 627-653, July-Aug. 1951.

10. Goldner, M. G., and Volk, B. W.: Fulminant normocholesteremic xanthomatosis (histiocytosis X); report of incidence in aged woman. *A. M. A. Arch. Int. Med.* 95: 689-698, May 1955.

THE MENACE OF NODULAR GOITERS

How great is the menace of nodular goiters, particularly single adenomas, still remains a debated question. No doubt the majority of patients, even if not treated, will survive without malignant changes ever developing within the gland. Yet the high incidence of carcinoma reported by many writers, especially appearing later on in nodular goiter, particularly of the single type, must give us pause. We have seen so many patients whose histories indicate that they have had nodular goiters for years which could have been readily enucleated and who now come to us with extensive, and frequently hopeless, carcinomas that we are compelled to feel that a thyroidectomy should be carried out in all instances of adenomatous goiter.

—J. REED BABCOCK, M. D.
in *Pennsylvania Medical Journal*
p. 1170, Dec. 1954

SERVICE ARTICLES

PRESENT-DAY MILITARY OBLIGATIONS

DANIEL C. ELKIN, *M. D.*

NO President of the American College of Surgeons, or, indeed, the head of any other responsible medical organization, will have done his full duty today if he does not speak out soberly, advisedly, and with due consideration on another subject, the role and obligations of all physicians in a world that may not be at war but is surely not a world at peace. In the event of thermonuclear warfare and an attack upon the industrial cities of the country which make up the target areas, there will be a flood of casualties over this land such as no battle in the history of the world ever before produced. The surviving casualty load will far exceed the immediately available medical resources. The immediate problems, mechanical trauma and thermal burns, are surgical problems, but it will require the services not only of surviving surgeons—all of us who survive—but of others also to cope with the situation. Battlefield principles must be applied. Preferential care in the system of priorities must be given to those who can be returned to duty rather than to those who are close to death.

The surgical profession has a heavy responsibility in planning and training and indoctrination against a day of disaster. Preparations may be puny but they may turn the scale for or against national survival or destruction in an all-out war. If any of us are to survive, it will be because in this time of specious peace, all of us have set our hands to the task while there is still time.

There is another point to be made in this connection. I think that we err greatly and are derelict in our duties, those of us who stand in the kind of office in which, by your graciousness, I find myself tonight, if we do not, firmly and unequivocally, take the position that the young man who now goes into medical practice must face and accept the almost inescapable fact that before he is free to follow his own desires, there is every chance that he may be called upon to give his time and service to the Armed Forces of the country.

Extract from the Presidential Address to the American College of Surgeons, delivered at the San Francisco Meeting, October 1956.

Dr. Elkin is at Elkin Place, Lancaster, Ky.

This is the situation: Every 18-year-old must register for military service. The prospective physician can request deferment while he finishes high school, while he completes his premedical work, while he is in medical school, while he serves his internship, and, perhaps, while he serves a year or more of residency. He will be granted these successive deferments without question if his grades and his performance warrant it. But, after he has been deferred for these nine years or more, there will come the almost inevitable day when he must enter some branch of service. I grant you that the situation as it exists is unfair and discriminatory. If the student desires to fulfill his military obligations when he is 18, and fulfills them then, it will profit him nothing when he has become a Doctor of Medicine. For all practical purposes he is in double jeopardy. He must still do service for two years as a medical officer. From that obligation there is little chance of escape.

Unfair? Yes. Wastage and inefficiency in the use of medical officers? Yes, there is undoubtedly some basis for this charge. But, I ask you, what are we going to do about it? The Act of Congress by which physicians must serve in the Armed Forces will expire in June 1957, but it will still remain the obligation of the Government to maintain a medical service with a balanced structure. The men in the service must be cared for in peacetime as well as in war. The Surgeons General of the Army, the Navy, and the Air Force are charged with these responsibilities. We of this College will be derelict in our own duties if we do not hold up their hands.

How best can we fulfill the obligations of the College in this regard? In two ways, I would say. First, we must take the position, automatically and without cavil, that as a matter of course every matriculating medical student must look forward to two years of service in the Armed Forces. Second, we must take our stand firmly against the cynical notion that is rather popular at this time, that these two years are a waste of time, almost a backward step in one's medical career. It is never a waste of time to serve one's country. I should like to see every instructor in every medical school devoting some of his teaching effort to refuting these notions and to emphasizing the concept that if these years are a waste of time, it is a reflection on the individual medical officer and on those who failed to prepare him for his military obligations rather than a reflection on the military services. Medical schools must take cognizance of the state of the world. This is a fundamental problem of indoctrination and orientation, and it is one to which I should like to see the College make a constructive contribution.

There exists no vacuum in the medical school curriculum, as I am well aware, for courses in military medicine. There is no reason, however, why certain matters of military medicine cannot be integrated into existing courses of medicine and surgery. We made a serious mistake in World War II in that we failed to use the surgical lessons of World War I. It is sadly true that the lesson of history is that the lesson of history is never learned.

As a matter of fact, there is a great deal in the story of surgery in World War II that is applicable to peacetime practice. Furthermore, given the chance, medical students show a surprising interest in that story. I have myself, since the war, devoted a good deal of time to recording my own surgical experiences in it and to hounding my confreres into reporting theirs. Some of these surgical histories are already available. Others will appear shortly. Still others are in preparation. You will find them interesting and profitable reading, whether or not you went to the wars, and, if you will permit me the plug, the Government Printing Office will be glad to sell them to you at a remarkably reasonable price.

THE INCIDENCE OF ALLERGY

Allergy is a common condition. Less frequent, probably, than some enthusiastic practitioners would claim and more common than is realized by a considerable number of physicians. There may be many who disagree regarding the classification of some conditions as allergic, but when the elimination of questioned conditions has been made by conservative men there still remains a hard core of approximately 10 per cent of the population who suffer from one or another condition unquestionably allergic.

—J. HARVEY BLACK, M. D.
in *Illinois Medical Journal*
p. 5, Jan. 1954

A PSYCHIATRIC STUDY OF A RETRAINING COMMAND

NATHAN SCHLESSINGER, *Lieutenant, MC, USNR*
DAVID BLAU, *Lieutenant, MC, USNR*

THE OPPORTUNITY to serve as a medical officer at a naval retraining command, which serves as a place of confinement for courts-martial prisoners with minimum sentences of four months, is a unique experience for a psychiatrist. Most psychiatrists have had little contact with this type of work in an ordinary civilian or Navy practice. Stresses arise in confinement which are unparalleled in everyday life, and serious emotional disturbances are not uncommon.

From our experiences as psychiatrists attached to this retraining command, we derived certain attitudes and impressions that form the basis of this article. Although some of our observations may be specifically pertinent to this retraining command, we believe that our comments may have general bearing on all such commands operated by the Navy.

Five hundred consecutive new arrivals appearing between October 1955 and January 1956 were routinely screened with an extensive personal history questionnaire completed by the prisoner himself, and with a social history and service record review by the Navy Classification Specialist. After this information was collected, each of the prisoners was seen briefly in psychiatric interview, and an appropriate diagnosis and recommendation for restoration, clemency, or administrative discharge were made.

CHARACTERISTICS OF PRISONERS

In brief, the average prisoner was young and had spent a relatively short time in the service. The majority had been awarded punitive discharges, and almost half the population were the product of broken homes (table 1). Many reported difficulties in school prior to entering the service, and a considerable number indicated a significant history of alcoholism. A large majority were confined for AWOL and desertion. Diagnostically, they fell into the category of severe character and behavior disorders.

From U. S. Naval Retraining Command, U. S. Naval Base, Portsmouth, N. H. Dr. Schlessinger is now at 5327 South Dorchester Chicago 15, Ill.

Of the 500 prisoners studied, 112 were being restored to duty. These men were compared with the over-all group. The only significant differences occurred in the distribution of the ages and the psychiatric diagnoses of the men. The restorees tended to be

TABLE 1. *Characteristics of 500 prisoners at a retraining command*

Characteristics		Per cent
Age	Under 21	69
	Over 21	31
Education* (grades)	0-8	38
	9-11	57
	Over 11	5
Marital status	Single	76.3
	Married	20.4
	Divorced	3.3
Branch of service	U. S. Marine Corps	49
	U. S. Navy	51
Length of service	Under 6 months	5
	6 to 24 months	58
	Over 24 months	37
Number of previous courts-martial	0	34
	1	32
	2	20
	3	9
	4	5
	5	<1
Current offense**	Desertion and AWOL	86
	Larceny	8
	Escape from confinement	3
	Disrespect to a superior	3
	Assault	2
	Forgery	<1
	Rape	<1
	Sodomy	<1
	Murder	<1
	Indecent exposure	<1
	Asleep on post	<1
	Absent from place of duty	<1
Type of disposition	Bad conduct or dishonorable discharge	77.6
	Automatic back to duty***	22.4
Revised Beta scores	Under 90	10
	90-110	69
	Above 110	21
Previous social adjustment	Civil offenses****	21
	Reform school	7
	Significant history of alcoholism	43

TABLE 1. *Characteristics of 500 prisoners at a retraining command* —Continued

Characteristics		Per cent
Broken home		44
Previous psychiatric treatment or consultation		4
Psychiatric diagnosis	Passive-aggressive reaction	25
	Emotional instability	18
	Immaturity reaction (not further classified)*****	18
	Passive-dependency reaction	8
	Inadequate personality	7
	Antisocial personality	2.2
	Alcoholism (chronic)	1.6
	Acute situational maladjustment	1.4
	Schizoid personality	1.4
	Sexual deviation (homosexuality)	1
	Chronic anxiety reaction	<1
	Neurotic depressive reaction	<1
	Aggressive reaction	<1
	Paranoid state	<1
	Asocial personality	<1
	Schizophrenic reaction (not elsewhere classified)	<1
	Normal range	12.5

*Fifty-one per cent reported trouble in school including failures, truancy, and difficulties with the teachers or other pupils.

**Only the most serious offenses of each man were counted. If several equally serious violations of the Uniform Code of Military Justice occurred they were counted separately. Offenses like breaking restriction and failure to obey a lawful order were omitted.

***Twelve of this group were recommended for administrative separation.

****Only serious offenses were included. The most frequent were breaking and entering, auto theft, and larceny.

*****This diagnosis was used to describe prisoners who were experiencing the usual difficulties of adolescence and might be expected to develop greater maturity in the future as they resolve their adolescent problems.

younger (78 per cent were under 21 years of age), and 19 per cent were considered to fall within the normal range. In all the other areas compared, the two groups were identical.

DISPOSITION OF PRISONERS

A great number of the restorees were considered psychiatrically marginal manpower who could be expected to occupy hospital beds, do inferior work, and get into further disciplinary trouble. Other studies[1-3] have described the extensive drain imposed on the service in attempting to use men with severe emotional difficulties. It was not surprising to learn that at least a third of the restorees were in disciplinary trouble within six months of leaving confinement.

It was recommended that about 10 per cent of the restorees be discharged from the service. This figure was modest in view of the number of psychiatrically handicapped men interviewed. If the policy regarding administrative separation would have permitted it, a larger number would have been recommended.

Many rational arguments were raised to oppose discharging men administratively. Some considered an undesirable discharge to be more punitive than a bad conduct or dishonorable discharge. Others objected on the grounds that an administrative discharge permitted men to escape from a contracted agreement to serve their country and to obtain the benefits of an honorable discharge. While it was true that these men would not serve out their enlistment if they were separated, it appeared likely that many of them would fail to do so after they were restored to duty. In addition, many of these men would be ultimately faced with further confinement and finally a punitive discharge.

We noted a tendency on the part of staff personnel to deal harshly with provocative prisoners who loudly proclaimed that they were not motivated for further service and were interested in being discharged. Such demonstrations frequently resulted in a prisoner being restored to duty as a form of further punishment. It was difficult for staff personnel to understand that such antagonistic behavior was part of the pathologic personality disorder of the inmate.

Duty personnel at retraining commands are concerned primarily with the problem of restoring men to duty. They are concerned about the number of prisoners who can be restored, and use this number as a sign of the success or failure of their mission. Unfortunately, this is an unrealistic goal from a psychiatric viewpoint. Many of the prisoners are suffering from serious personality disorders; to ask such people to adjust to military life successfully is similar to requiring men crippled by heart disease to run daily obstacle courses. Until recent times, even among psychiatrists, there was hesitation in recognizing that character and behavior disorders represent serious emotional difficulty. It was, therefore, understandable that duty personnel should feel that "acting out" could be readily controlled by conscious means.

Retraining commands are fortunate in being adequately staffed with personnel who can carry out the entire process of administrative separation. The presence of such experts as the legal officer, psychiatrist, psychologist, Red Cross representative, and administrative personnel affords an ample opportunity of obtaining a broad picture of the inmate's personality and type of performance before confinement. The work supervisors and other duty personnel provide a picture of the adjustment in confinement. This careful screening and evaluation of each case should prevent the unnecessary separation of personnel who might be of value to the service.

It is understood that the criteria for administrative separation must vary with the manpower needs of the service. In time of peace, when the selection criteria for entrance into the service are relatively high, administrative separation might well be used more frequently throughout the service. Certainly in dealing with serious character and behavior disorders, it would be well to consider greater use of this kind of action in the future.

EFFECTS OF CONFINEMENT

Confinement provides a repressive environment in which the prisoners have lost their primary external objects for psychosexual gratification. Opportunities for using the familiar technic of acting out, so commonly employed by these men to handle their problems, are of necessity diminished by this repressive atmosphere. In spite of the external controls, however, some of the men continued to act out in confinement and became disciplinary problems. In general, these men had difficulty in controlling impulsive sexual and aggressive behavior. Some of the men in confinement experienced considerable internal anxiety, but usually there was an admixture of acting out and internally experienced anxiety.

Depressive reactions in confinement occurred rather infrequently and were hardly ever of serious proportions. Psychotic reactions in confinement were also observed infrequently. As a general rule, those prisoners who became psychotic in confinement rapidly recovered when they were removed from confinement and placed in a hospital situation. It was our feeling that recovery occurred because a specific kind of stress, namely, confinement, was removed. We are aware that some people would consider the possibility that those prisoners exhibiting psychotic symptoms might be malingering, but usually the ones who did develop psychotic reactions were described as either "borderline psychotics" or "prepsychotics" in their initial screening interview. The most typical psychotic reaction seen was that of paranoid schizophrenia.

Anxiety reactions frequently appeared a few weeks before a prisoner's release from confinement and were noted more often in those men who were receiving punitive discharges. Usually these feelings were related to the men's fear of losing control of impulses upon leaving confinement, as well as to the realistic problems confronting them in regard to their punitive discharges. Most of the prisoners expressed concern about obtaining a job, and many were afraid to face their families. It was often noted that they submitted requests to see the psychiatrist and complained of generalized nervousness, insomnia, aggressive impulses toward duty personnel, or a desire to change their living quarters. Such requests usually indicated mounting internal anxiety, which was frequently followed by acting out if the requests were not immediately handled.

The large majority of prisoners in confinement do not experience pathologic anxiety reactions nor do they become disciplinary problems as a result of their acting out. Many of the men react with an acceptance of the confinement situation. Confinement itself tends to protect people from their own impulses as well as to provide for their dependent needs. In addition, the prisoners are provided with a target, namely, the duty personnel, for covert expressions of hostility. There is a considerable amount of group support among prisoners that enables the majority to remain out of disciplinary trouble.

The problem of malingering becomes extremely important when the prisoner is referred for psychiatric evaluation as the result of disciplinary difficulties. It is always difficult to separate the conscious motivation and desires of the prisoner from his unconscious problems. Disciplinary difficulties frequently are manifestations of increasing tensions arising as the result of the need to control forbidden impulses. It often is difficult for custodial personnel, who have been dealing with these men as conscious and willful individuals, to realize that they have been acting out their unconscious emotional problems and are suddenly sick enough to require psychiatric attention. In general, although malingering often has the outward appearance of a dramatic conscious attempt to avoid responsibility, it is usually associated with serious unconscious emotional problems. As a result of the lack of awareness on the part of duty personnel, men with psychiatric problems were often viewed as deliberately provocative and threatening, and were usually handled in a repressive fashion.

We decided to study those men who were involved in disciplinary action of a serious nature and try to determine whether men with certain types of character disorders were more prone to cause trouble in confinement. Table 2 compares the psychiatric diagnoses of 100 men who had been reported for disobedience of orders at the retraining command, with the diagnoses of the 500 men catalogued in table 1. The latter group provides a picture of the precentage of various character disorders scattered throughout the institution. The offense of disobedience was selected because it usually represents an outright refusal to co-operate with authority figures.

Table 2 shows that men diagnosed as having passive-aggressive reaction, emotional instability reaction, and antisocial personality were more frequently reported for disobedience than one would expect from their normal percentage in the population. It was also significant that all of the men who became psychotic in the institution were reported for disobedience.

Another interesting group, made up of those men who were not reported for disobedience as frequently as one might predict from their distribution in the population, were those diagnosed as

TABLE 2. *Psychiatric diagnoses of 100 men reported for disobedience during confinement compared with those of the total group studied*

Diagnosis	Reported for disobedience (per cent)	Total group studied (per cent)
Passive-aggressive reaction	32	25
Emotional instability reaction	25	18
Immaturity reaction (not further classified)	9	18
Inadequate personality	8	7
Antisocial personality	8	2.2
Schizophrenic reaction (not elsewhere classified)	3	<1
Passive-dependency reaction	2	8
Schizoid personality	1	1.4
Sexual deviation (homosexuality)	1	1
Aggressive reaction	1	<1
Addiction (drug)	1	<1
Normal range	9	12.5

having either immaturity reaction (not further classified) or passive-dependency reaction. One possible explanation for this might be that these two groups were composed of dependent men who received a great deal of gratification in confinement by having their oral needs satisfied and therefore did not have to resort to further acting out.

PRESENT PROGRAM

Rehabilitation efforts are difficult when men being prepared for return to duty after confinement are subjected to the same physical and disciplinary environment during confinement as those who will be returned to civilian life with punitive discharges. There has been some recognition of this problem at this retraining command, where a physically separate unit (Camp Langdon) was established. This unit functions specifically for the purpose of providing restorees with an atmosphere approaching normal service life, and prepares them to return to the duties expected of them. Men with punitive discharges are retained in a closely supervised institution and undergo a completely different experience.

It is our opinion that, even though the two groups are psychiatrically similar, their separation is necessary. It is important that those men who are being returned to duty be prepared to face

their realistic problems and requirements in a military setting, while those men with punitive discharges have already demonstrated their difficulties in adapting to military life and are being realistically prepared to face the problems of civilian life. It would seem, therefore, that rigid military training and supervision of a highly repressive nature is no longer necessary for the latter group and would be unrealistic from the psychiatric standpoint.

Too restrictive an atmosphere is dangerous, for it causes a rise in frustration and anger which is suddenly released when the man resumes his place in society. Much of the hostility is then turned toward the only available target—society. This emphasizes the need for intelligent application of control in confinement, and toleration of expressions of hostility prior to the man's release. Group psychotherapy of an analytic orientation would be expected to have a highly beneficial effect in a freer atmosphere, whereas in a restricted atmosphere such therapy is extremely difficult if the ventilation of feelings is to be followed by punishment.

One of the basic difficulties in handling men with punitive discharges is the attitude of duty personnel who view military prisoners as criminals and do not realize that these men will be free in civilian life. There is a great deal of danger in emphasizing or exaggerating the punitive aspects of a bad conduct discharge or dishonorable discharge. It leads the prisoners to expect that they will be unable to procure employment or be accepted by the community. This produces anxiety and makes them feel that they can never become useful and productive citizens after being earmarked with such discharges. For this reason, men who are aware of their own shortcomings and lack real desire to return to duty, feel compelled to ask for restoration to duty, but restoration ultimately results in further difficulty for prisoners restored under such circumstances.

Certain portions of the present program are extremely important and provide the dischargees with vocational training and education. A fairly complete program is available in a number of trades that the prisoners can pursue in civilian life. In addition, elementary and high school courses are offered on request for those men whose education has been neglected in the past. Spiritual guidance and counseling is also available, but the lack of trained social workers who can bridge the gap between the prison and the community causes a serious deficiency in the program. Many of the men require assistance in solving family problems, and obtaining jobs or even a place to live, and need referrals to outside social agencies. In addition, a sizable number require psychiatric treatment when they leave confinement.

The problem of training men returning to duty might be materially reduced if those men with severe emotional difficulties

were placed in the same training program as those being prepared for civilian life and administratively discharged instead of being returned to duty. Up to the present time, no attempt has been made to follow the discharged men into the community and determine their adjustment in civilian life. Such a study, investigating the effect of confinement on these men, would be extremely profitable.

SUMMARY

A study of 500 typical prisoners at this naval retraining command indicates that a considerable percentage of the prisoners were the product of broken homes, had been in trouble in school, and had used alcohol to excess. Serious civilian delinquency prior to enlistment was often reported. Eighty-five per cent of the prisoners had character and behavior disorders.

The men receiving punitive discharges were similar in almost every detail to the men returning to duty. A third of the restorees were in disciplinary trouble within six months of leaving confinement. Greater use of the administrative discharge for restorees is recommended.

Pathologic reactions to confinement appeared most often in the form of anxiety reactions and disciplinary offenses. These reactions were produced by the attempt to control forbidden impulses which threatened to come to the surface, as well as by the prisoner's concern about their punitive discharges.

Prisoners committing disobedience offenses in confinement were primarily those with a passive-aggressive reaction, emotional instability reaction, or antisocial personality. On the other hand, those diagnosed as having passive-dependency reaction and immaturity reaction were infrequently reported for disobedience.

In accomplishing the retraining of prisoners, it is important to maintain a separate program for restorees and those awaiting discharge to civilian life. Prisoners awaiting restoration to duty should be placed in a military setting similar in many ways to normal service life. Those awaiting punitive discharges should be prepared to assume the responsibilities of civilian life; for them, a rigid program of military training seems unrealistic.

The lack of psychiatrists and trained social workers, and insufficient contact with civilian social and psychiatric agencies are major deficiencies in the program.

A follow-up study of discharged prisoners to evaluate the effect of confinement on their civilian adjustment would be of interest.

REFERENCES

1. Caveny, E. L.: Utilization of psychiatric marginal manpower in military service. *Ann. Int. Med.* 42: 659-667, Mar. 1955.

2. Hunt, W. A.; Wittson, C. L.; and Hunt, E. B.: Military performance of group of marginal neuropsychiatric cases. *Am. J. Psychiat.* 109: 168-171, Sept. 1952.

3. Raines, G. N.; Wittson, C. L.; Hunt, W. A.; and Herrmann, R. S.: Psychiatric selection for military service. *J. A. M. A.* 156: 817-821, Oct. 30, 1954.

416757 O - 57 - 7

EXPERIENCES IN PROVIDING SALAD VEGETABLES TO AMERICAN FORCES IN JAPAN

LYMAN P. FRICK, *Lieutenant Colonel, MSC, USA*
GOTTLIEB L. ORTH, *Colonel, MC, USA*
NEIL O. WILSON, *Colonel, VC, USA*
WALTER F. MALIZIA, *Captain, MSC, USAR*
RALPH O. ANSLOW, *Lieutenant Colonel, VC, USA*

IT IS probably not generally realized that providing green vegetables in the diet of troops can become an important military problem. A salad of lettuce, tomatoes, green peppers, carrots, and green onions mixed with a savory dressing is as great a morale factor as fresh milk, meat, and ice cream. United States servicemen become accustomed to eating fresh raw vegetables in their homes before they enter military service and they expect to see these foods regularly wherever their tours of duty take them.

The problem of supplying fresh vegetables to troops in the Far East Command has been complicated by several factors. Ordinarily fresh vegetables grow profusely throughout Japan, Korea, and the Ryukus Islands during the proper seasons. Nothing would seem more natural than to be served these foods in troop messes and clubs, except that nearly all fresh vegetables grown in the Orient are potentially contaminated, due to the use of night soil (human excreta) as fertilizer. This is one phase of orientation that most troops remember, at least in part, although many persons may later become careless in their off-post eating habits.

Night-soil fertilization has been the prime concern. Intestinal parasitism and other enteric infections that may be transmitted by contaminated foods are common in the Far East, and surveys of the Japanese civilian population beginning in late 1945 indicated that appreciable increases in the incidence of some of these infections had occurred during the war years. As a result of the

From the 406th Medical General Laboratory, and Preventive Medicine Division and Veterinary Branch, Office of the Surgeon, USAFFE/8th U. S. Army (Rear), APO 343, San Francisco, Calif. Col. Frick is now assigned to Sixth Army Area Medical Laboratory, Fort Baker, Calif.

shortage of medicines and physicians and concomitant curtailment of health programs during World War II, the occurrence of ascariasis, for example, had increased from a prewar average incidence of about 36 per cent to nearly 80 per cent.[1] Inasmuch as almost all repatriated Japanese troops and laborers from the islands of the Pacific and the Asiatic mainland were infected with some type of intestinal parasite, their return undoubtedly brought to the home islands many amebic carriers.

During the early occupation years the policy of American authorities was to take as little food as possible from the then meager resources of the Japanese. To complicate the problem further, water supply and housing were in a chaotic state and engrossment with general sanitation left a low priority for laboratory or field studies to determine the safety of local foods. All of these factors precluded extensive purchases of fresh produce by the military for troops in the Far East Command.

The problem of supplying fresh vegetables to troops in the Far East has had to be handled differently at different times. The purpose of this report is to survey the methods whereby these foods were obtained prior to 1955 and thereafter, and to review medical and laboratory data that might affect vegetable procurement.

PROCUREMENT OF VEGETABLES PRIOR TO 1955

Between the end of 1945 and early 1955 the only officially approved sources of vegetables, and in particular salad vegetables, for general troop use and commissaries were two hydroponic farms in Japan and produce from the United States. Quantities were constantly limited by the high cost of establishing additional hydroponic farms and the shortage of refrigerated transoceanic shipping space. An additional limitation was the short storage life of highly perishable items when imported from the United States. As an example, a considerable proportion of all tomatoes was lost due to spoilage even when the fruit was picked green and shipped under refrigeration. Additional spoilage occurred during transshipment to Korea. These conditions continued until early 1955.

During the same period, eating establishments operated by clubs, post exchanges, and approved Japanese hotels and restaurants served fresh vegetable salads throughout the year. Eating places operated by the military services were authorized to purchase many types of local produce on a warranty basis. It was required that vegetables be grown in chemically fertilized soils, or on Japanese hydroponic farms using only chemical fertilizers. Army Veterinary Corps inspections were made on this produce at wholesale warehouses or at the ultimate destination, but often

little or no knowledge of the real origin of the vegetables was possible. Salad vegetables purchased under warranties were not authorized for use in troop messes or commissaries.

Troop messes in Japan and Korea have always served nutritious meals. This was true even during the most severe battle conditions of the Korean campaign. However, fresh vegetables often were unavailable in some areas for days or weeks, particularly during the nongrowing season when all vegetables came from the United States.

PROCUREMENT ON A TRI-SERVICE BASIS

By 1952 or 1953 vegetable production in Japan and Okinawa had recovered to the point where actual surpluses developed in Japan, and relatively large purchases could be made without adverse effects on the Japanese market. If safe sources for vegetables could be established, troops could be supplied more liberally and at a great saving. The main problem, however, lay in developing these safe sources. Chemical fertilization seemed to be an obvious requisite. Rudolfs, Falk, and Ragotskie,[2] in an article published in 1951, had concluded that vegetables grown under conditions of surface sewage contamination showed no higher coliform contamination than those grown on normally farmed soils. Inasmuch as this study had been made in the United States, it might not be entirely applicable to the situation in the Far East, especially in view of the exceedingly common occurrence of gastro-intestinal infections in the latter area.

It could be assumed that nearly all vegetables are grown in the Far East under conditions of night-soil fertilization, and there is a mass of evidence to incriminate this practice in the transmission of enteric infections in areas of high endemicity; therefore indiscriminate purchases of salad vegetables were not deemed advisable. Furthermore, nearly all arable soil in Japan was probably already contaminated with enteric organisms, several of which are known to persist in soils for relatively long periods. Such soils could be potentially hazardous even if chemical fertilizers were used. Hence it was evident that if adequate supplies of vegetables, especially salad vegetables, were to be procured locally, principal consideration had to be given to establishing appropriate standards for their production and purchase.

As a result of a series of meetings attended by representatives of the Army, Navy, and Air Force, a tri-service directive[3] was published in late 1954. This publication marked the first attempt in this theater to obtain uniformity between the three services in policies governing the procurement of local foods. The directive assigned central control of approved sources of foods to the veterinary branch of the Surgeon's Office, U. S. Army Forces,

Far East, 8th Army (Rear), and classified the types of vegetables that could be purchased without reference to approval of source and those that could be obtained only from approved sources. In addition, the directive established minimum sanitary requirements for the production, harvesting, processing, and delivery of salad vegetables. It was specified that growing plots had to be so located that they would not receive drainage from adjacent areas where night-soil fertilization was practiced. Growers were required to furnish a warranty that chemical fertilization had been practiced exclusively for at least four months prior to approval and would be continued for the duration of their contracts. Processing of vegetables at farms was prohibited; instead, growers were required to deliver their produce as harvested to processing sheds. Operators of these were required to comply with certain standards of sanitation, and were permitted only to process vegetables from approved farms. It was also specified that produce had to be delivered in clean, covered vehicles, and use of these for transporting contaminated materials was prohibited.

Japanese farms consist of a number of plots which may range in size from about 100 square feet to a maximum of approximately 6,000 square feet. Farmers living in close proximity organize into co-operatives and elect a supervisor to assist members in production and marketing. Action leading to approval or disapproval of a farm area ordinarily proceeds somewhat as follows. The request for approval is made by the co-operative to a Quartermaster Corps purchasing officer. After receipt, the request is forwarded to a veterinary inspector who travels to the area, performs an over-all appraisal, and selects plots from which soil samples are collected for laboratory examination. Samples are collected from at least 20 per cent of the plots and from at least five points within each selected plot. Soil from the surface of an area of from 1 to 2 square feet is lightly scraped into a sterile wax-paper-lined paper bag with a sterile tongue depressor and transmitted to the 406th Medical General Laboratory where it is examined for human helminth ova and enteric bacteria. Sixty per cent of soil samples are required to be free from *Escherichia coli* and viable parasite ova. After inspection and laboratory examinations have been accomplished the inspector makes appropriate recommendations to the approving authority. If approval is given, a contract is made for the purchase of a quantity of vegetables; this quantity is based on a reasonable estimate of the production of the farms in the co-operative. Periodically during the term of the contract samples of a vendor's produce are drawn for laboratory examination. No more than 10 per cent of such samples can be contaminated by either *Esch. coli* or parasitic ova. This figure has never yet been reached.

The response of local producers to the program was excellent, and the program progressed so successfully that by the end of the first growing season (fall of 1955) it was possible to obtain practically all needs of this theater for salad vegetables from local sources and at competitive prices. Since that time it has been required that all purchases be made from approved sources. In order to ensure an uninterrupted supply of tomatoes, cucumbers, and green peppers at the start of the program, those not obtainable from approved sources continued to be obtained under the warranty system. This authorization was rescinded in late 1955. Shipping costs and spoilage losses have been greatly reduced, with a concomitant reduction in subsistence costs. One Quartermaster Corps hydroponic farm has been scheduled for shutdown as a result of the success of the program. This farm had proved its value, although it was an expensive source of vegetables. The program has also been well received by the military public. It was required, however, that military facilities serving or selling locally procured food indicate these items on menus and placards.

FACTORS AFFECTING USE OF LOCALLY PROCURED PRODUCE

The Army Medical Service in the Far East was eager to increase the fresh components of the ration and to help in reducing ration costs by allowing the purchase of as many fresh vegetables and fruits as possible. However, in recommending the use of local produce it had to consider that (1) there was a plethora of gastro-intestinal infections in the Far East which possibly were associated with fresh vegetables, and (2) the occurrence of such infections in American troops had been held to favorably low levels.

Many extensive surveys of the bacteriologic and parasitologic causes of intestinal diseases have been made in Japan, particularly since 1945. These studies have been made by many groups of American investigators among troops and their dependents and among Japanese employees. Other special studies have been made on specific diseases in co-operation with Japanese medical authorities. In addition, the Japanese maintain extensive public health records which also include occurrence of gastro-intestinal diseases.

In table 1, data on the occurrence of ascariasis among the Japanese civilian population have been summarized for the years between 1930 and 1954. These data were obtained from Japanese public health records, and include examinations of school children and government and industrial workers throughout Japan. There has been gradual improvement since 1946; but infection rates are still high by western standards.

TABLE 1. *Occurrence of ascariasis in Japan between 1930 and 1954**

Year	Persons examined	Percent positive
1930	516,986	50.6
1935	609,331	42.0
1940	593,759	37.2
1945	413,241	54.8
1946	821,765	67.2
1947	2,055,274	65.2
1948	3,334,597	62.9
1949	5,599,078	62.5
1950	7,220,649	59.6
1951	6,552,430	55.1
1952	6,191,607	48.3
1953	7,707,763	43.2
1954	8,019,238	38.0

*Data from Japanese public health reports.

Other Japanese reports show that diarrhea, enteritis, and "ulceration of the intestine" have been leading causes of death in Japan since 1900, the rate per 100,000 for that year being 130.7 for the group. In 1954 the rate was reduced to 38.9; however, in the years between 1920 and 1932 the rate was never lower than 200. No records were kept for the years 1943 through 1946, but the rates were undoubtedly high. Deaths from these causes ranked eighth in 1954, the rate being 38.9 per 100,000 population, or about the same as deaths from accidents (including motor vehicle accidents) which had a rate of 39. Gastroenteritis and colitis (except ulcerative colitis in children age four weeks and over) were the main causes of death in children one to four years of age in the period 1950 to 1954. During the same period, dysentery was the second principal cause of death in the same age group. These reports give some indication of the problems experienced by the Japanese with intestinal diseases.

The U. S. Army's 406th Medical General Laboratory has conducted many studies on the incidence of helminthic and protozoan infections in the Japanese civilian population. A comprehensive report published in 1951[4] on representative population groups in all four main Japanese islands showed that ascariasis incidence was lowest (44 per cent) in the mountain areas of Hokkaido, and highest in the agricultural areas of Shikoku (91 per cent), Kyushu (92 per cent), Central Honshu (89 per cent), and Hokkaido (93 per cent). The same report noted that marked variations occurred in the incidence of amebiasis, with the lowest and highest indices occurring in Hokkaido (2.9 per cent and 26.2 per cent). The overall average for Japan in 1951 was estimated to be about 7.5 per

cent, with cities having a lower rate than farm areas. Later, this figure was revised upward to about 12 per cent.

By way of contrast, there has apparently been little change in the occurrence of intestinal parasitic infections in American military personnel and their dependents in Japan since 1946. Data on 3,518 American personnel and 1,159 Japanese employees of U. S. Forces summarized in table 2 are representative and are useful in determining the basic levels of infection. Practically all of the Americans were dispensary patients from the Tokyo area, and presumably had complaints possibly attributable to parasitic infections. The Japanese usually were young adults and assumed to be in good physical condition.

TABLE 2. *Occurrence of parasitic infections in American military personnel and dependents, and among certain Japanese civilian personnel (Tokyo, Japan, January to December 1954)**

	Americans		Japanese	
	Number	Per cent	Number	Per cent
Persons examined	3,418		1,159	
Positive for parasites	751	22.0	649	56.0
Helminth infections				
Ascaris lumbricoides	217	6.3	249	21.5
Trichuris trichiura	91	2.7	231	19.9
Hookworm	60	1.8	68	5.9
Trichostrongylus sp.	12	0.4	169	14.6
Enterobius vermicularis	36**	1.1	4	0.3
Strongyloides stercoralis	12	0.3	3	0.3
Others	12	0.3	10	0.9
Protozoan infections				
Entamoeba histolytica	71	2.1	36	3.1
Entamoeba coli	149	4.4	120	10.4
Endolimax nana	180	5.3	137	11.8
Giardia lamblia	91	2.7	50	4.3
Others (known nonpathogens)	29	0.8	3	0.3

*From Professional Report, 406th Medical General Laboratory, 1954.

**Not indicative of actual number of infections because cellophane tape preparations were not used in all instances.

A study of intestinal parasitism among 4,438 food handlers in the Third Army Area (including 925 soldiers with Korean service, 2,799 without Korean service, and 714 civilians) was reported in this *Journal* by Radke and associates.[5] The summary of the report stated in part that, "Military personnel who had Korean service showed a slightly higher incidence of helminth infections, but the total of the agents recovered was higher from military personnel who had no Korean service."

The relationship of bacteria of the paracolobactrum group to intestinal disease has been studied extensively at the 406th Medical General Laboratory and published in this *Journal* in 1954 and 1955.[6,7] Whether the presence of these organisms on vegetables is indicative of human fecal contamination is not sufficiently understood, nor is their pathogenicity completely known. Feeding enteric organisms of doubtful pathogenic nature to human volunteers is the only acceptable method for determining pathogenicity. To our knowledge, such experiments with adults have not as yet been performed. Therefore, there is insufficient specific evidence available at this time to indicate the danger of these organisms to young, healthy adults in the military service. On the other hand, several strains of paracolobactrum were recovered from a large number of service personnel involved in several food poisoning outbreaks,[8] and the role of certain members of this group of bacteria in diarrheas and dysenteries in children is well established. For this reason considerable caution is still required in recommending open purchase of salad vegetables in the Far East.

It is evident from this brief analysis of medical data that the military medical services faced a serious problem, and it is obvious that it was necessary for them to move cautiously. Similarly, any reluctance to change an existing, although costly, system is readily understood.

CURRENT AND CONTEMPLATED LABORATORY STUDIES

In addition to the field and laboratory studies referred to in previous sections, implementation of the tri-service directive necessitated other laboratory studies that were in more direct support of the program. These studies have been conducted by the 406th Medical General Laboratory and have been directed along three lines. It was first necessary to establish suitable standards of acceptability for vegetable produce and, after this was accomplished, to provide a continuing program of examinations on produce obtained from approved contract sources. Lastly, studies were to be undertaken to devise better laboratory technics, and to investigate more thoroughly the actual role of night-soil fertilization in the transmission of enteric organisms.

Bacteriologic and parasitologic examinations of soils were required as a part of the preliminary inspection of farms. *Esch. coli* and ova of *Ascaris lumbricoides* were used as the principal indicators of fecal contamination. Although the presence of these organisms will indicate only approximately when contamination occurred, the examinations provided a good index to the infection potential in the soil. Since it could be assumed that both organisms would probably be found in a proportion of any soil samples,

it was improbable that any large number of ideally acceptable farms would be found. Therefore, it was necessary to establish certain minimum standards of acceptability. This was accomplished by an extensive study on soils and vegetables obtained from an Army-operated farm and farms of vendors then supplying produce under warranty, and vegetables imported from the United States. These standards which have been defined in a previous section, are considered to be realistic and practicable. They have been used as a basis for issuance of contracts as well as to control the acceptability of produce offered by contractors after approval.

As soon as purchases of salad vegetables were started under the provisions of the directive, a program was instituted in the departments of medical zoology and bacteriology whereby representative samples of vegetables were examined for parasitologic and bacteriologic contamination. Procedures which have been standardized and adapted for routine use were employed for both types of examinations.*

The extent of either type of contamination on vegetables has not been great. Parasitologic findings from routine examinations made during the latter half of 1955 are summarized in table 3, and bacteriologic findings for the same period are presented in table 4. In addition to *Esch. coli,* paracolobactrum were also used as

TABLE 3. *Summary of parasitologic examinations on vegetables procured from approved local contractors, 1955**

Vegetable	Samples		Number positive	Ova recovered		Per cent embryonated	
	Number	Per cent of total		Ascaris	Trichuris	Ascaris	Trichuris
Lettuce	530	19.5	11	33	0	18.2	-
Celery	125	4.6	11	31	2	6.5	0.0
Cabbage	218	8.0	2	2	0	0.0	-
Radish	143	5.3	3	1	4	100.0	0.0
Tomato	305	11.2	2	7	3	0.0	100.0
Carrot	212	7.8	2	4	0	50.0	0.0
Onion	119	4.4	3	1	6	0.0	100.0
Others**	1,063	39.2	4***	6	0	66.7	0.0
Total	2,715		38	85	15	17.6	60.0

*From Professional Report, 406th Medical General Laboratory, 1955.
**Predominantly salad vegetables; few samples of cooking vegetables included.
***Two samples of rutabagas and two of potatoes.

TABLE 4. *Isolation of* Escherichia coli and Paracolobactrum coliforme *from vegetable and soil samples**

Vegetable	Samples		Positive samples			
			Esch. coli		P. coliforme	
	Number	Per cent of total	Number	Per cent**	Number	Per cent**
Cabbage	244	12.3	9	3.7	20	8.3
Carrot	175	8.8	2	1.1	8	4.6
Celery	82	4.1	6	7.3	9	11.0
Lettuce	471	23.8	9	1.9	36	7.6
Parsley	140	7.1	16	11.4	22	15.7
Radish	128	6.5	5	3.9	9	7.0
Tomato	280	14.1	1	0.4	13	4.6
Cucumber	103	5.2	0		9	8.7
Onion	105	5.3	1	1.0	3	2.9
Pepper	105	5.3	0		5	4.8
Others***	147	7.4	5	3.4	10	6.8
Total	1,980		54	2.7	144	7.3
Soils	2,396		156	6.5	65	2.7

*From Professional Report, 406th Medical General Laboratory, 1955.
**Per cent of total number of specimens of a type.
***Principally salad vegetables; few fruits and cooking vegetables represented.

indicators of bacterial contamination. The vegetable most frequently contaminated with parasites was celery; 8.8 per cent of 125 samples contained ova of *A. lumbricoides* or *Trichuris trichiura,* while only 2.1 per cent of the lettuce samples were contaminated. Together these vegetables accounted for 58 per cent of the total number of parasitologically positive samples. Although the incidence of contamination with ova was high, the total number of ova found was relatively small. Only 15 ascaris and 9 trichuris eggs were actually involved.

Esch. coli was found in 2.7 per cent of vegetable specimens and *Paracolobactrum coliforme* in 7.3 per cent. Parsley was the principal offender; 11.4 per cent of the samples carried *Esch. coli* while *P. coliforme* was found in 15.7 per cent. The occurrence of the two bacteria on celery closely matched the relatively high rate of parasitologic contamination, rates for the bacteria being 7.3 per cent for *Esch. coli* and 11.0 per cent for *P. coliforme.*

Lettuce was infrequently contaminated with *Esch. coli* (1.9 per cent) although the occurrence of *P. coliforme* was fairly great (7.6 per cent).

Contamination on tomatoes, cucumbers, and green peppers was observed only infrequently. Because of this and the fact that they are easily washed, it is anticipated that these vegetables will be removed from the list of products that must be purchased from approved sources.

It should be noted that nearly all vegetables were received in "as delivered" condition, hence the extent of contamination was not necessarily indicative of what would be expected after the vegetables had been trimmed and prepared for serving. Interpretation of parasitologic examinations on vegetables was complicated by the fact that laboratory tests indicate that the examination procedure is only about 60 per cent reliable. Hence, it is possible that a comparatively high proportion of positive samples and ova might have been missed. However, the procedure is not selective for ova in particular stages of development.

Ova of ascaris and trichuris were found in 18.5 per cent of the routine soil samples examined during the last six months of 1955, while the rates for *Esch. coli* and *P. coliforme* were 6.5 and 2.7 per cent, respectively. All samples were examined as a phase of the initial inspection of farms, and in some instances approval was not given because of evidence of excessive contamination.

It is recognized that these laboratory studies are essentially expedients and that information should be obtained on several additional points. A fundamental problem is to devise technics or procedures whereby "recent" fecal contamination can be differentiated from contamination that might result from organisms already in the soil. This differentiation is important because the first type can be controlled, but the latter cannot. For this reason consideration is being given to the use of possibly shorter-lived organisms such as enterococci as indicators. Also, the millipore filter technic as used by Slanetz and associates[9] for the recovery of micro-organisms may prove to be adaptable for soil and vegetable examinations, thus permitting the use of larger samples.

In view of observations such as those made in the United States by Rudolfs, Falk, and Ragotskie[2] and Wang and Dunlop,[10] it is evident that care must be taken not to impose excessively strict requirements on vegetable producers in areas such as Japan. These observations have suggested the desirability of comparing the occurrence of enteric bacteria and helminth ova in soils and vegetables in areas of Japan where different agricultural practices are followed. Such a study is in progress at the 406th Medical General Laboratory. The investigation has been expanded to per-

mit a more comprehensive study of the role of vegetable produce in the epidemiology of ascariasis and trichuriasis.

SUMMARY

Fear of gastro-intestinal infections among the United States Armed Forces and their dependents in the Far East has resulted in the past in elaborate precautions to avoid such diseases by empirical methods. By extending this concern to the matter of fresh vegetable procurement, the military prior to 1955 resorted to the costly expedient of obtaining its supply of these important foods from hydroponic farms and sources in the United States. Experience with a general food procurement program implemented in early 1955 has demonstrated that with well-conceived and properly executed sanitary standards, it has been possible to develop in Japan and Okinawa a safe supply of salad vegetables on a scale sufficiently large to be practical and, equally important, to eliminate much unwarranted concern.

ACKNOWLEDGMENT: Special acknowledgment is given to Lieutenant Colonel William Wyatt, MSC, USAR; Colonel Benjamin F. Leach, USAF (VC); Colonel Ralph Cleland, MSC, USA; Lieutenant Colonel Oscar Felsenfeld, MC, USAR; Captain Robert W. Babione, MC, USN; Lieutenant Richard Kaufman, MSC, USN; and Lieutenant Henry E. Bloom, MSC, USN, for participation in formulating the tri-service directive and for support given to implementing the present food procurement program.

REFERENCES

1. Toyoshima, A.: Personal communication.

2. Rudolfs, W.; Falk, L. L.; and Ragotskie, R. A.: Contamination of vegetables grown in polluted soil. *Sewage and Indust. Wastes* 23: 992-1000, Aug. 1951.

3. *Procurement of Indigenous Food Products in Japan,* Aug. 20, 1954. Published jointly by Headquarters, U. S. Army Forces, Far East (AFFE Circular No. 145), Commander Naval Forces, Far East (COMNAVFE Instruction No. 4213.4) and Headquarters Far East Air Forces (FEAF Regulation No. 160-32).

4. 406th Medical General Laboratory, U. S. Army: Parasitological studies in Far East; summary of common intestinal and blood parasites of the Japanese. *Japan Logistical Command Bull.* No. 4, p. 51, 1951.

5. Radke, M. G.; Thomas, R. C.; Mracek, J. F.; Nibley, C., Jr.; and Aronson, R. S.: Is Korean service a health hazard to civilian communities? *U. S. Armed Forces M. J.* 6: 794-798, June 1955.

6. Eveland, W. C.; Freeman, N. L.; Felsenfeld, O.; and Kase, A.: Study of Paracolobactrum coliforme strains isolated in Far East. *U. S. Armed Forces M. J.* 5: 1683-1687, Nov. 1954.

7. Eveland, W. C.; Felsenfeld, O.; Babione, R. W.; Kuhns, D. M.; and Kase, A.: Further studies of Paracolobactrum coliforme strains in Far East. *U. S. Armed Forces M. J.* 6: 1605-1618, Nov. 1955.

8. Professional Report, 406th Medical General Laboratory, 1955. In Press.

9. Slanetz, L. W.; Bartley, C. H.; and Bent, D. F.: Evaluation of membrane filters for the determination of numbers of coliforme and enterococci in water. Bact. Proceedings, 1954 General Meeting. Pittsburgh, Pa., 1954.

10. Wang, W. L. L., and Dunlop, S. G.: Animal parasites in sewage and irrigation water. *Sewage and Indust. Wastes* 26: 1020-1032, Aug. 1954.

DYNAMIC FACTORS IN PSYCHIATRIC DISCHARGES OF MIDSHIPMEN

DEAN J. PLAZAK, *Lieutenant, MC, USN*

THE GOAL of the United States Naval Academy is to provide midshipmen with a basic education and knowledge of the naval profession and, by tradition and example, to indoctrinate them with the highest ideals of duty, honor, and loyalty, for the purpose of providing the naval service with capable junior officers.

Adjustment to the program devised to carry out this goal necessarily requires that each midshipman accept the challenge not only of pursuing a college education, but also of making an abrupt change from civilian to military life. The entire summer before the freshman academic year is set aside to help the new midshipman with this transition. Personal counseling with regard to problems which seemingly arise out of this adjustment is provided by each midshipman's company or battalion officers throughout the four years.

When persistent problems appear to stem from long-standing personality disorders or from psychiatric illness, outpatient psychiatric evaluation and treatment facilities are available in the Academy's medical department, and inpatient care is available at the U. S. Naval Hospital in Bethesda, Md.

Assistance in attaining and maintaining a healthy adjustment to the new environment is also provided through mental hygiene and leadership courses conducted by the department of psychology. This program additionally provides confidence and support for midshipmen contemplating and later accepting needed outpatient psychiatric help.

Each year approximately one tenth of the total midshipman population is disenrolled. Fifty per cent of these midshipmen are discharged by reason of academic failure, 10 per cent for serious or repeated violations of regulations, and 10 per cent by reason of physical or psychiatric disability; 30 per cent resign for personal reasons. Difficulty in personal adjustment to the academy appears to be an important factor in all of the

From U. S. Naval Hospital, National Naval Medical Center, Bethesda, Md.

disenrollments even if only the general reasons just listed are considered.

In the course of detailed clinical evaluations conducted on those midshipmen referred for inpatient psychiatric care in 1955, it became apparent that the dynamic determinants of their illnesses appeared to be closely related to their specific difficulty in personal adjustment to the setting of the Naval Academy. The ability to establish a successful masculine relationship with both peers and authority figures seemed to be the most important criterion of successful adjustment. Knowledge of the reasons for inadequate adjustment was recognized as potentially valuable in reducing the number of yearly disenrollments.

Complete clinical records of 44 midshipmen discharged from the Naval Academy from mid-1948 to mid-1955, by reason of emotional disorders, were available for this study. In each instance, these records contained a complete physical, laboratory, and mental examination; detailed psychometric testing, including Wechsler-Bellevue and Rorschach tests; comprehensive interviews with parents or guardians obtained by trained social workers; and verbatim interviews with the patients. The academic, health, personal, and disciplinary records of all of these patients were obtained for study from the registrar of the Naval Academy.

PRECIPITATING STRESSES

Symptoms of illness in these midshipmen appeared at seven specific times of stress during the four years. Thirty-two of the 44 patients required inpatient care after their initial difficulty at one of these times, 12 after 2 or more of these 7 periods of stress (fig. 1).

Ten of the 44 midshipmen experienced difficulty during freshman class or "plebe" summer. They found the academy far different from what they had expected, were homesick, or felt unprepared for the emphasis placed on teamwork and competition. These reactions represented ambivalence with regard to dependency needs and lack of individual self-confidence and self-esteem. Three of these 10 midshipmen required inpatient psychiatric care at this time.

The return of the upperclassmen in the fall of the freshman year was described by 20 of the 44 midshipmen as the major source of their difficulty. They felt unable to meet such demands as were made on their behavior and performance by the upperclassmen. They were introduced at this time to such traditional practices as performing errands and chores and answering numerous questions by rote for demanding upperclassmen. This appeared to arouse precariously controlled aggressive feelings toward

authority, feelings of inadequacy under stress, and fear of attack. Sleepwalking was reactivated at this time in two patients who had experienced this difficulty in childhood. Ten of these 20 midshipmen required inpatient psychiatric care.

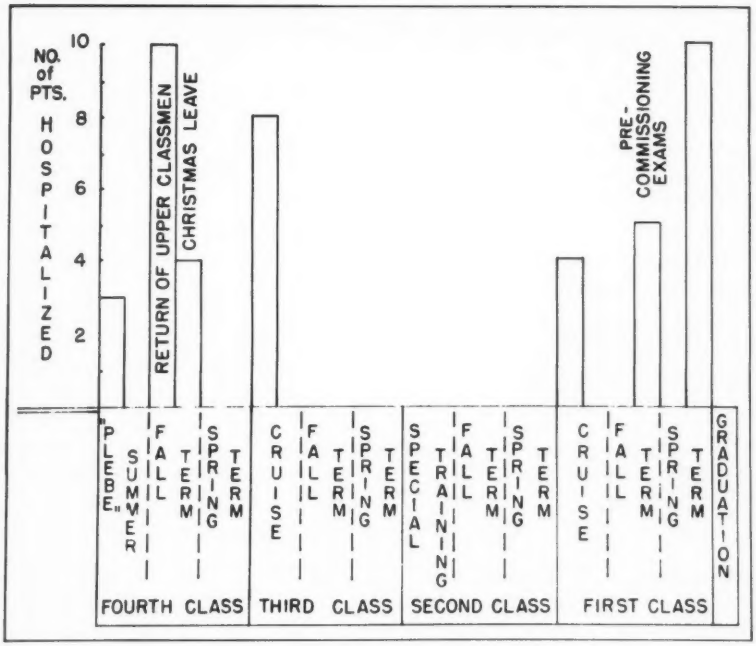


Figure 1. Specific stress periods leading to hospitalization.

A lack of desire to return from Christmas leave granted during the freshman year was expressed by 5 of the 44 patients. Their feelings appeared to be dynamically similar to those of the first two groups, wherein a temporal opportunity was used to make their feelings more emphatic. Four of these men required inpatient psychiatric care at this time of stress.

The purpose of the two summer cruises taken prior to the sophomore and senior academic semesters is to train the midshipmen in the operational duties of watch and division officers, and to assist them in adapting to the environment aboard ships at sea. Twelve of the 44 patients in this series appeared with various complaints in the psychiatric department at the academy prior to the sophomore class summer cruise. Eight required inpatient care. The remaining 4 of these 12 students appeared again before the senior class summer cruise and required inpatient care. They all appeared to be in panic over thoughts of the

relatively isolated confines of a ship and especially at the thought of leaving land. In addition, there were strong feelings of being unable to meet the responsibilities of an officer assigned a specific task which he must accomplish. The tasks that seemed to produce the most anxiety were those requiring individual judgment, such as directing a group of men in an assigned navigation problem. Irritability over having to sacrifice personal comfort, privacy, and desires because of the close relationships aboard ship was a problem to some of these 12 midshipmen.

The sixth stress period occurred at the time of the final physical and personal examination for commissioning, which takes place in the fall of the senior year, and the seventh in the two months prior to graduation. Fifteen of the 44 patients were admitted to the hospital at these times, most of them with physical complaints. Dynamically, these two groups displayed resistance to the assumption of the responsibilities of a commissioned naval officer. A substantial number used these opportunities to indicate their previously unexpressed personal desires for other life pursuits. Their attendance at the Naval Academy appeared to be an attempt to gain better relationships with paternal figures by accepting their fathers' goals as their own.

BEHAVIOR IN THE ACADEMY SETTING

Each of the 44 patients displayed an individualized response to the setting of the Naval Academy in terms of behavioristic difficulties. This was further reflected in the wide variety of diagnostic categories in which the patients were placed, varying from personality disorders to overt psychoses. However, their responses fitted into four major categories, with some types of behavior such as suicidal gestures and physical complaints common to all four. Lack of voluntary participation at the Academy in sports involving bodily contact was characteristic of all 44, and only 8 participated to any extent in team sports of noncontact type.

The four major categories of behavior responses to the Naval Academy setting have been designated as groups A, B, C, and D. The 12 patients in group A showed a behavior pattern characterized by passive resistance. They studied and met recitation standards, but did not pass examinations. Their disciplinary demerits were acquired by carelessness in personal appearance; tardiness in reporting for appointments, drill formations, and class formations; losing official papers and personal possessions; and having disorderly rooms. The performance of this group in intramural athletic competition was poor. Over half of the patients in group A complained frequently to the outpatient medical staff of headache, backache, and diffuse gastro-intestinal upsets. Three of these 12 had over 5 hospital admissions for

416757 O - 57 - 8

complaints of this type before their psychiatric inpatient care began.

The 14 patients in group B displayed behavior which was aggressively resistant. Academically, they did not prepare assignments, did not meet recitation standards, and made little effort to pass examinations. They frequently gave "I don't know" as a recitation answer. These patients did not do well in their personal relationships with other midshipmen, and were especially antagonistic to upperclassmen. Their demerits were acquired by failure to keep good military discipline, open disregard for rules, improper performance or neglect of assigned duties, and disorderly conduct in ranks of an attention-getting nature. This group repeatedly attempted to submit resignations which were not accepted because parents or guardians would not consent. Such consent is necessary if the midshipman is under 21 years of age.

The six patients in group C openly questioned and challenged authority in the academic classes and in military and athletic activities. They were demanding of special attention and attempted to lure those in authority into long, argumentative discussions. This group insisted that the regulations of the Naval Academy were at fault and were designed to irritate them personally, and acquired their disciplinary demerits for unwarranted assumption of authority, unauthorized absence, and disrupting and disorderly conduct.

The 14 patients in group D made a concerted effort to appear to conform, and behaved in a withdrawn, seclusive, ruminative fashion. They displayed little or no initiative, avoided responsibility and assumption of authority, and would perform assignments in a slow but satisfactory manner only if it were mandatory. They were academically borderline, gradually falling into the "nonpass" category. Their disciplinary difficulties were caused by progressive deterioration of personal appearance, and awkwardness in military and athletic groups.

A further means of objectively evaluating and categorizing dynamically significant behavior was provided by the "aptitude for service" system. This is a system designed to determine, on a comparative basis within each class, a midshipman's ranking in attitude, performance of duty, leadership, and military bearing. Rankings are made by fellow class members, upperclassmen, and staff members. The aggressively resistant patients in group B were consistently ranked low in military bearing, the "challengers" in group C low in service aptitude, the withdrawn patients in group D low in leadership. Most of the patients in all four groups ranked medium in all the other ratings. The difficulty in ranking patients from group A, experienced by both

peers and authority figures, indicates the varying success of passive-resistant behavior.

FATHER-SON RELATIONSHIPS

Objective and subjective evaluations of the patients' relationships with their fathers were made in each of the 44 cases.

Objective evaluation revealed that the father was deceased in 6 of the 44 cases, and in 4 instances had been replaced by a stepfather who was rejecting or withdrawn. In 4 of the 44 cases the parents were divorced, the child's custody awarded to the mother, and subsequent contact with the father either nonexistent or unfavorably looked on. In the remaining 34 intact homes, 16 of the fathers appeared to be dominant, rigid, unapproachable, difficult to please, and excessively demanding; 10 had a serious problem with excessive use of alcohol, 4 were unsettled in occupations or were drifters or unemployed, 3 were absent from the home most of the time by choice, and 1 was passive, unresponsive, and withdrawn.

Subjectively, 18 of the 44 patients complained of their fathers as difficult to get to know and to get along with, 14 were fearful of their fathers, 4 reported they had no father, 2 showed open dislike for their fathers, 2 knew other men they would have preferred as fathers, 2 described their fathers as chronically ill, and 2 expressed no opinion.

MOTIVATION FOR ENROLLMENT AT THE NAVAL ACADEMY

In objectively determining individual motivation for coming to the academy, a notable lack of personal desire was found. It appeared that no midshipman in this study enrolled because of his own wishes but rather to meet one or more specific personality needs of others. Twenty-six could not have been supported in college on a paying basis by their families, often because of poor financial planning. Twenty-four enrollments were obviously used as a means of raising family prestige or social standing. Twenty-two enrollments were desired by the father of the family, 10 ostensibly because the son "needed to learn discipline." In each of these 10 cases there was a history of a disciplinary problem at home, in school, or during a previous enrollment in a military school. This data again stresses the important role of identification with the father involved in the behavior of these patients, as well as the difficulty that many would experience in voluntarily resigning from the Naval Academy because of family and community repercussions.

INTERRELATIONSHIPS AND DISCUSSION

The four groups of behavior responses to the Naval Academy setting, A, B, C, and D, and certain types of father-son relation-

ships were found to be significantly related. A father-son relationship was considered significant if it applied to 75 per cent of a behavior group. Patients in group A, characterized by passive-resistant behavior, were fearful of or showed covert hostility to their fathers, and the fathers were dominant, rigid, unapproachable, demanding, and difficult to please. Dynamically, this group of patients had devised a passive means of expressing dissatisfaction that still allowed a never-ceasing effort to try to obtain a much-desired relationship, but bypassed the impossibility of a direct approach. Members of group B showed aggressively resistant behavior at the Academy, complained of fathers who were difficult to know and to relate with, or were openly hostile to their fathers, and the fathers were divorced, separated, absent frequently by choice, unemployed, or drifters. This group was much more openly expressive of the dissatisfaction felt toward an inadequate father, and at the same time identified by behaving in the same "rule-breaking" fashion.

Group C, who were openly questioning and demanding of authority, said they had no father or complained of a difficult relationship. These fathers were deceased, some later replaced by stepfathers who were rejecting or withdrawn. These patients aggressively expressed their ambivalence over being forced to accept the paternal role in their families, and over a continued need to be cared for as the son. Group D, the quiet, withdrawn, conforming patients, reported their fathers were sick, or denied a difficult relationship. These fathers were objectively considered to have serious problems with excessive use of alcohol. This group displayed identifying behavior of a passive-dependent quality, and reflected the feelings of inadequacy and lack of self-confidence of their fathers.

The patients in all four groups continued to relate to the setting of the Naval Academy as they previously did to their fathers. This was reflected in their specific disciplinary and academic difficulties. An insecure father-son relationship appears to predispose difficulty in adjusting to situations requiring further relationships with male peers and authority figures.

The appearance of suicidal gestures, physical complaints, and other examples of acting-out behavior as initial symptoms of difficulty emphasizes the feeling that all these patients did not have a good enough relationship with any male authority to be able to discuss their difficulty openly. This feeling appeared to be based upon their experiences at home. The fear of failing in the eyes of their peers, families, and home communities was strong. The expression of physical or even serious emotional sickness, as represented by a suicidal attempt, seemed a more acceptable way out of an intolerable situation for these 44 patients than facing it directly.

The general lack of participation in group or body contact sports reflects the lack of desire for and inexperience in competition due to feelings of inadequacy and marked emotional investment in difficult family relationships.

Twenty-seven of these patients were failing academically on admission to the hospital. All had intelligence levels of bright normal or above. This finding illustrates the well-known interference with intellectual activity by emotional difficulties.

CONCLUSIONS AND SUMMARY

Forty-four clinical records of midshipman patients discharged from the United States Naval Academy for psychiatric reasons were studied to determine what significant dynamic factors led to their need for inpatient care.

Precipitating stresses in their illnesses were found to occur at seven specific times, dynamically related to feelings of dependency, repressed hostility, lack of good verbal communication with male parents, feelings of inadequacy with regard to responsibility and leadership tasks, and competition with peers.

Behavior patterns used in adjusting to the environment of the Naval Academy during the four years were found to fall into four general categories and to be closely interrelated with previous unsatisfactory father-son relationships. Dynamically, these technics represented expressions of dissatisfaction with those relationships, and covert wishes to improve or change them.

Acting-out rather than verbalization of feelings was characteristic of all of the patients. Presenting symptoms such as physical complaints were often related to an anticipated loss of respect by family, community, and peers in the event that they should request to resign from the Naval Academy.

Reasons for entrance into the Academy were usually found to be unrelated to the patient's personal desires, and met one or more specific personality needs of others, usually their fathers'.

Data of this type are recognized as potentially useful in screening Naval Academy applicants and in reducing the 10 per cent of the total midshipman population that is disenrolled each year for various reasons. The disciplinary and academic difficulties experienced by midshipmen discharged for psychiatric reasons are very similar to those experienced by midshipmen disenrolled for academic and disciplinary reasons.

Further exploration of the data evolved from these case studies appears to be indicated. Recognized factors not discussed in this article are previous community and peer relationships, attitudes and behavior of other midshipmen toward those having

difficulty in adjusting, and resistance to early acceptance of need for psychiatric help. A long-term statistical and dynamic study of all members of an entire class now in progress at the Naval Academy should provide valuable and needed control data for this case material, not practical in the present study.

PHYSICIAN AND DISASTER

"Plans must be made for proper reception and registration of casualties, for skillful and rapid diagnosis of injuries, for the utilization of recognized procedures and for the formation of teams of skilled auxiliary workers. To assure themselves of having an opportunity to render good medical service during a disaster and its aftermath, physicians must take the lead in making certain that similarly careful planning has been done in the related fields of rescue, communication, transportation, and fire and police work. Thus, two distinct obligations face the physicians: acquistion of recognized technics for the handling of medical emergencies, and stimulation of training of auxiliary workers. Men and women in related health fields are eager for the leadership which only the medical profession can give."

—HAROLD C. LUETH, M. D.
in *Journal of Iowa State Medical Society*
p. 145, Mar. 1956

Vivax Malaria Without Primary Attack in Korean Veterans

RICHARD S. HOMER, *Captain, USAF (MC)*

THE conclusion that malaria never became a problem during the Korean campaign because of the routine use of chloroquine prophylaxis by the U. S. armed services has been supported by many investigators.[1-4] Malaria did become a problem, however, when the drug was discontinued and the troops returned to the United States.[1-5] The many and varied symptoms, plus a usual paucity of or often misleading physical findings, causes difficulty in making the diagnosis, as was well illustrated by Hall.[3]

Beginning December 1951, personnel of the U. S. armed services were given primaquine (15 mg base) daily for 14 days on the return trip from Korea.[6] This was done in an attempt to combat both the known tendency of Korean vivax malaria to recur after a latent period of 9 to 10 months and the known failure of suppressive chloroquine therapy to protect Korean veterans from relapse. This program has been effective but there have been cases of relapse reported despite the routine use of primaquine.[7]

The most important of the conclusions reached in previous studies were that (1) relapse of Korean vivax malaria may occur in the absence of an earlier primary attack, despite primaquine prophylaxis, and after the Korean veteran returns to the United States; and (2) it is difficult to establish the diagnosis, especially for medical officers not acquainted with the disease, because of the often misleading history and physical findings.

CASE REPORT

A 21-year-old Negro soldier was admitted to this hospital 2 August 1955 complaining of frontal headache, malaise, and sore throat of one day's duration. Onset was sudden, and by the day of admission he was febrile but repeatedly denied having chills. Past history was significant in that he was stationed in Korea from February 1954 until January 1955, during which time he had no illnesses. He stated that he took the prescribed chloroquine in Korea and primaquine on the return trip to the United States.

From U. S. Air Force Hospital, Beal Air Force Base, Calif. Dr. Homer will be at Veterans Administration Hospital, 5901 East Seventh Street, Long Beach 4, Calif., after 1 April 1957.

Physical Examination

Physical examination revealed an acutely ill, toxic man. His temperature was 101°F; pulse, 100; and blood pressure, 122/75 mm Hg. Ear canals and drums were inflamed. The throat was markedly injected and the tonsils were enlarged and red, but had no exudate. There was cervical, axillary, and epitrochlear lymphadenopathy. Heart and lungs were normal. Liver and spleen could not be palpated, although there was moderate punch tenderness over the liver.

Laboratory Studies

Complete blood cell count, urinalysis, and a roentgenogram of the chest were within normal limits. A cardiolipin test was negative. No bile was found in the urine, and urobilinogen was in normal concentration. Febrile agglutinins, heterophile antibodies, Weil-Felix agglutinations, van den Bergh reaction, cephalin-cholesterol flocculation test, stool examinations, and roentgenograms of the gallbladder were within normal limits.

Course in Hospital

For the first six days in the hospital, the patient ran an intermittent spiking fever up to 105°F, associated with extremely severe headaches. During this period he showed no response to large amounts of penicillin and chlortetracycline hydrochloride (aureomycin). Examination of the temperature curve on the fifth hospital day revealed that the temperature spikes came at 48-hour intervals with afebrile and asymptomatic periods between the spikes. During an afebrile period on the fifth hospital day, trophozoites of *Plasmodium vivax* were found on a thin blood smear. More mature forms were found during a temperature spike the next day. The patient was then begun on the standard treatment of 1 gram of chloroquine immediately, followed by 0.5 gram of chloroquine six hours later, and then 0.5 gram per day for the next two days. Fifteen milligrams of primaquine base per day was begun with the chloroquine and maintained for 14 days.[8] The patient showed an immediate response and became afebrile and asymptomatic. The liver tenderness persisted after he became afebrile but subsided by the end of the 14 days of therapy. He was discharged at the end of therapy and continued to be well on subsequent follow-up visits.

DISCUSSION

Two other cases seen at this hospital and an additional case admitted to the 2473d USAF Dispensary were similar to this one in that there was no history of a previous attack of clinical malaria. This corresponds to findings of other studies.[3,4,9,10] In all four cases the "initial" attacks appeared in August or early September, at least four months after the men left Korea. This corresponds to a latency period of 9 to 10 months, inasmuch as the period of infectivity of Korean vivax malaria is between April and October.[3,4,9] It would seem that although the initial infestation

occurred in Korea, either the prophylactic chloroquine taken there prevented the appearance of clinical malaria,[4] or as is sometimes seen in untreated Korean vivax malaria, a primary attack never occurred.[4,9,10]

It is well known that chloroquine, even in therapeutic doses, will affect only the erythrocytic phase of malaria, and thus will not prevent relapses. Controlled studies of primaquine were reported to demonstrate that at doses of 15 mg of the base daily for 14 days, relapse of Korean vivax malaria would be prevented in 99 per cent of cases.[7,9] Use of this regimen for returning Korean veterans has decreased the rate of relapse, but the four cases described here support the observation of Hansen, Cleve, and Pruitt[7] that occasional relapses do occur despite primaquine prophylaxis. In all fairness, it must be added that the only evidence that primaquine prophylaxis was taken in these four cases, is the statements of the patients themselves.

These cases illustrated both the difficulty of making a diagnosis of malaria when one does not suspect it, and the ease of diagnosis once the suspicion of malaria is aroused. Two cases were unusual in that chills were never experienced by the patients, nor seen by an observer. The most impressive features were the high fever and severe headache. Fever, stiff neck, and severe headache in one patient resembled encephalitis or meningitis; however, spinal fluid studies were within normal limits. All patients complained of malaise, anorexia, and in general presented a "flu-like" picture. One patient complained of sore throat, two had nasal congestion, and three had pharyngeal lymphoid hyperplasia. Only one patient had a history of chills and fever every 48 hours, and fortunately the private physician who saw him initially had once practiced in an endemic malaria area of California and was familiar with the disease.

Splenomegaly was absent in all four cases, although it was present in 28 per cent of Hall's[3] series, and in the case recently reported by Rogers.[5] Hepatomegaly was not present but two patients did have punch tenderness over the liver. As in Hall's series, many of the other physical findings were misleading and often suggestive of diseases other than malaria.

None of the four patients had anemia, but one did have leukocytosis. In all patients, the cardiolipin test for syphilis was negative. As in Hall's series the diagnosis of malaria was made with thin blood smears using Wright's stain. It is generally accepted, however, that the probability of making a correct diagnosis is increased when thick blood smears are used.

All four patients showed immediate response to the standard chloroquine-primaquine therapy as did the previously reported cases. There was no evidence of primaquine toxicity in either the Negro or Caucasian patients.[11,12]

In as many as 50 per cent of the cases reported by Hall, 14 diseases other than malaria were listed as the admitting diagnosis. Besides the causes for error in diagnosis discussed here and in Hall's article, another important factor delaying diagnosis of malaria is a physician's lack of experience with the disease. These were the first cases of malaria seen by me and the other physicians who saw these patients initially. As was illustrated by these cases, it is not safe to rule out the possibility of malaria because of previous prophylactic administration of chloroquine and primaquine.

CONCLUSIONS

"A high index of suspicion for malaria is warranted in returning veterans with febrile illnesses in order to establish correct diagnoses."[5] This "high index of suspicion" should be maintained despite the prophylactic use of chloroquine and primaquine. The warning should be heeded not only by military physicians, but also by civilian physicians, because many of the men returning from endemic malaria areas may have returned to civilian life before a relapse of malaria occurs.

REFERENCES

1. Coggeshall, L. T.: Malaria. In Harrison, T. R., and others (editors): *Principles of Internal Medicine.* 2d edition. Blakiston Co., Inc., New York, N. Y., 1954. pp. 1139-1144.

2. Aquilina, J. T., and Paparella, J. A.: Malaria in returned veterans of Korean war; clinical observations. *J. A. M. A.* 149: 834-838, June 28, 1952.

3. Hall, L. A.: Korean vivax malaria; statistical analysis of 95 patients. *U. S. Armed Forces M. J.* 6: 20-34, Jan. 1955.

4. Hankey, D. D.; Jones, R., Jr.; Coatney, G. R.; Alving, A. S.; Coker, W. G.; Garrison, P. L.; and Donovan, W. N.: Korean vivax malaria; natural history and response to chloroquine. *Am. J. Trop. Med.* 2: 958-969, Nov. 1953.

5. Rogers, F. B.: Vivax malaria in returned Korean veteran. *U. S. Armed Forces M. J.* 6: 1657-1660, Nov. 1955.

6. Alving, A. S.; Arnold, J.; and Robinson, D. H.: Status of primaquine; mass therapy of subclinical vivax malaria with primaquine. (Report to the Council on Pharmacy and Chemistry) *J. A. M. A.* 149: 1558-1562, Aug. 23, 1952.

7. Hansen, J. E.; Cleve, E. A.; and Pruitt, F. W.: Relapse of vivax malaria treated with primaquine and report of one case of cyanosis (methemoglobinemia) due to primaquine. *Am. J. M. Sc.* 227: 9-12, Jan. 1954.

8. Garrison, P. L.; Coker, W. G.; Jastremski, B.; Coatney, G. R.; Alving, A. S.; and Jones, R., Jr.: Status of primaquine; cure of Korean vivax malaria with pamaquine and primaquine. (Report to the Council on Pharmacy and Chemistry) *J. A. M. A.* 149: 1562-1563, Aug. 23, 1952.

9. Eddleman, E. E., Jr.; Hale, W. H.; and Snowden, W. M.: Vivax malaria with long incubation periods; report of 7 cases. *U. S. Armed Forces M. J.* 2: 1693-1698, Nov. 1951.

10. Arnold, J.; Alving, A. S.; Hockwald, R. S.; Clayman, C. B.; Dern, R. J.; and Beutler, E.: Natural history of Korean vivax malaria after deliberate inoculation of human volunteers. *J. Lab. & Clin. Med.* 44: 723-726, Nov. 1954.

11. Clayman, C. B.; Hockwald, R. S.; Edgcomb, J. H.; and Alving, A. S.: Status of primaquine; toxicity of primaquine in Caucasians. (Report to the Council on Pharmacy and Chemistry) *J. A. M. A.* 149: 1563-1568, Aug. 23, 1952.

12. Hockwald, R. S.; Arnold, J.; Clayman, C. B.; and Alving, A. S.: Status of primaquine; toxicity of primaquine in Negroes. (Report to the Council on Pharmacy and Chemistry) *J. A. M. A.* 149: 1568-1570, Aug. 23, 1952.

Tumors of the Testis in Infants

EVAN L. LEWIS, *Lieutenant Colonel, MC, USA*

MUCH has been written in the past 10 years on tumors of the testis, but from the literature one would think that the incidence of this disease in infants is rare. One of the most recent articles on the subject is that of Doyle,[1] who gathered 25 cases and added one of his own. In the past three years, three patients less than three years of age were admitted to this hospital with tumors of the testis. One of these tumors turned out to be a fibrosarcoma of the tunica albuginea, and the other two were undifferentiated adenocarcinoma (embryonal carcinoma). During this same period 17 adults were admitted with tumor of the testis. This suggests that the actual incidence in children is higher than we have previously believed.

Tumors of the testis may arise from any of the elements that comprise this organ. This includes tumors of connective and vascular tissue, as well as tumors of germ-cell origin. Friedman and Moore[2] found 35 per cent of 922 tumors of the testis to be teratocarcinomas; 7 per cent were teratomas, 19 per cent embryonal carcinomas, 35 per cent seminomas, 1 per cent interstitial cell tumors, and 3 per cent rare or unclassifiable varieties.

As for tumors of germ-cell origin, the generally accepted theory today is that they are all derived from a totipotent cell.[2-4] If this totipotent cell does not undergo differentiation, the seminoma is formed. Moore[5] and Friedman and Moore[2] preferred to call this tumor germinoma for that reason. With differentiation the tumor may go into one of two directions. It may form all three germ layers; in which case a teratoid tumor is formed, either immature (teratocarcinoma) or mature (teratoma). When this differentiation is not complete, an embryonal type of tumor is formed. This tumor is composed of primitive ectodermal tissue and may form a papillary adenocarcinoma, an undifferentiated adenocarcinoma, or an undifferentiated carcinoma with no attempt at glandular formation. The difference between this type of tumor of primitive ectoderm and the more vicious cytotrophoblast, which is principally trophectoderm, is very small from the histo-anatomic standpoint in that the cells are similar and both arise, from the same

From Tokyo Army Hospital, Tokyo, Japan. Col. Lewis is now assigned to Letterman Army Hospital, San Francisco, Calif.

ectodermal anlage. To the clinician, though, there is a considerable difference in survival rate, in rapidity of tumor growth, and in mode and rate of metastasis.

Trophectoderm is a differentiated cell similar to the Langhan's cell of the chorion. It develops from primitive ectoderm. This cell metastasizes early, and usually via the blood stream rather than by the lymphatics. If there are syncytial cells along with the trophectoderm, then the tumor comes under the classification of syntrophoblastoma, also termed chorioepithelioma.

Moore[5] suggested that the last three groups, namely, embryonal carcinoma, cytotrophoblastoma, and syntrophoblastoma, be lumped together. Yet there is enough difference in survival rates (65 per cent for embryonal, 16 per cent for the trophoblastomas) to make the differentiation.

The classification of an individual tumor is often not clear inasmuch as a given tumor may contain any one of the four major elements. A 7½-pound intra-abdominal tumor removed here was 75 per cent seminoma, but the other 25 per cent was made up of primitive ectodermal, trophectodermal, teratomatous, and syncytial tissues.

It is now the practice to classify any given tumor according to the most malignant cell present according to the following scale, which begins with the least malignant and progresses to the most malignant: seminoma, primitive ectoderm, immature teratoid tissue, trophectoderm, and trophectoderm with syncytium.

Table 1 shows the results obtained in the Walter Reed series (1942-1945),[2,4,6,7] and with the above-named classification gives some indication of prognosis and treatment.

TABLE 1

Type of tumor	5-year survival (per cent)	Average radiosensitivity (roentgen units)	Recommended tumor dose for maximum treatment (roentgen units)
Seminoma	85	800-1,500	2,000
Undifferentiated carcinoma	65	3,000-4,000	4,000
Teratocarcinoma	50	3,500-5,000	4,000
Trophocarcinoma	16	4,000 plus	4,000

CASE REPORTS

Case 1. A two-year-old white boy was transferred to this hospital 17 May 1954. Past history revealed that he had been operated on when seven days old for pyloric stenosis. Three months prior to admission

a plastic repair of the abdominal scar was done. Approximately two weeks prior to admission the parents noted an enlargement of the left testis. On 14 May 1954 the left testis was removed through an inguinal incision. On histologic examination the tumor was malignant, type undetermined.

On admission to this hospital the inguinal sutures were in place without evidence of reaction. Physical examination revealed no other abnormalities. A roentgenogram of the chest was normal. Hemogram was normal and a urinalysis was negative. On 18 May 1954 a left radical retroperitoneal lymph node resection was carried out. There was no evidence of metastatic cells in the nodes. The final pathology report stated that the tumor was a fibrosarcoma of the tunica albuginea (fig. 1) which had replaced more than 60 per cent of the normal testicular tissue. No x-ray therapy was given, and the patient was discharged two weeks postoperatively.

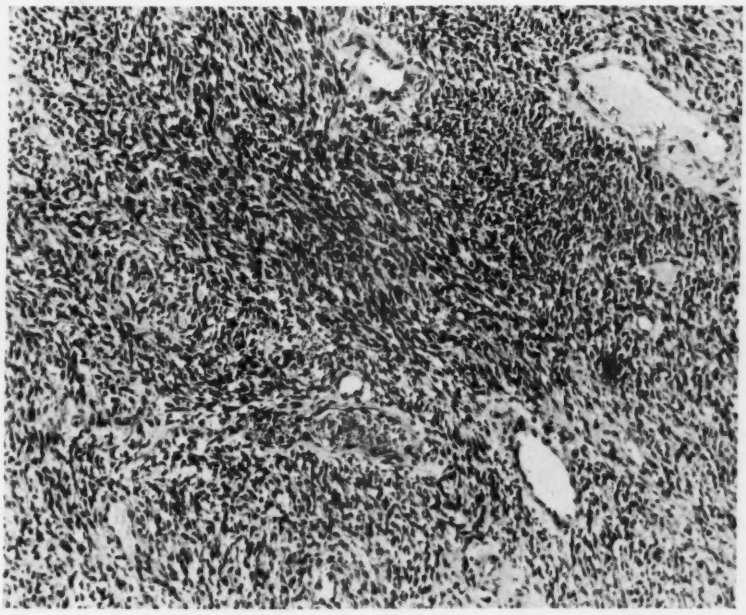


Figure 1 (case 1). Fibrosarcoma of tunica albuginea. Note typical, fairly uniform pattern. (× 110)

On 22 October he was readmitted to this hospital because of the recent development of a pea-sized lump in the left side of the scrotum. This lump was smooth in outline, firm, movable, and nontender. General physical examination and a roentgenogram of the chest were negative. On 26 October 1954 this scrotal mass was removed with considerable

surrounding tissue. The tumor was similar microscopically to the original tumor. Follow-up at 18 months was negative.

Case 2. While having his two-year-old son treated in the outpatient dispensary for a laceration, the father mentioned a swelling of the child's scrotum which had been present for from 2 to 3 months. The physician examined the child and advised immediate admission. The general physical examination revealed no abnormalities. The right testis was normal. The left testis was firm, irregular, and measured 4 by 6 cm. It was not attached to the scrotal wall and the cord felt normal. A roentgenogram of the chest and an intravenous urogram were normal. A hemogram was normal and a urinalysis was negative.

The next day an orchiectomy was performed through an inguinal incision. Because the pathologist reported an undifferentiated adenocarcinoma (embryonal carcinoma) of the testicle (figs. 2 and 3), a radical

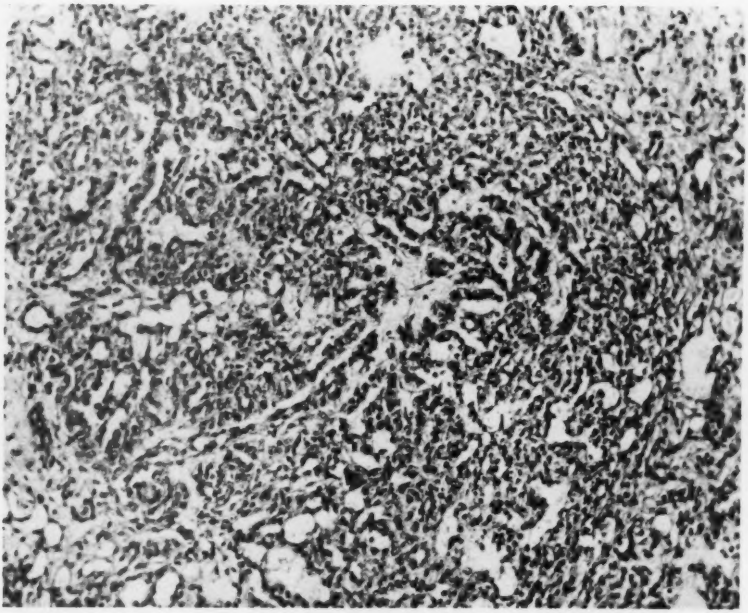


Figure 2 (case 2). Undifferentiated adenocarcinoma (embryonal carcinoma). Cells of primitive ectoderm arranged in an undifferentiated pattern. Center area shows early attempt at pseudoglandular formation. (× 110)

retroperitoneal lymph node resection was carried out on the left side 2 August. All nodes were stripped to the diaphragm. Inasmuch as there was no evidence of metastases, it was decided not to give this child postoperative irradiation. One year after surgery he was gaining weight normally, he appeared normal on physical examination, and a roentgenogram of his chest revealed normal findings.

Case 3. An 8-month-old white male infant was first seen 18 January 1956 because of a firm swelling of the left testis. The diagnosis of hydrocele was considered, and an attempt was made to aspirate the sac. This was unsuccessful and the parents were told by the local physician that operation was necessary. On 22 January the patient was admitted to an Army hospital. The physical examination on admission was negative except for a large, 3- by 4-cm left testis which was firm and of regular consistency. The skin was erythematous at the site of the aspiration. The cord was not thickened and felt normal. A hemogram was normal and a urinalysis was negative. A roentgenogram of the chest revealed normal findings.

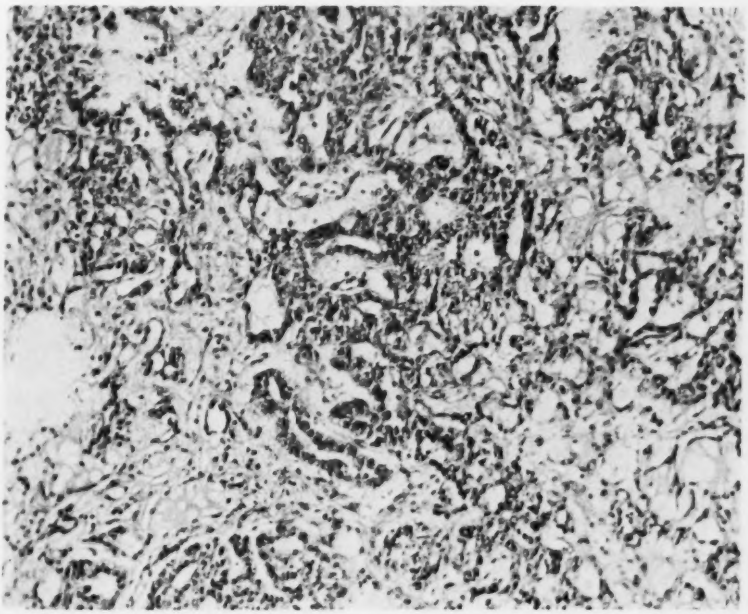


Figure 3 (case 2). Undifferentiated adenocarcinoma. Another section showing more advanced glandular formation. This supports the diagnosis of undifferentiated adenocarcinoma. (× 110)

On 24 January the left testis was removed through an inguinal incision. The pathologist considered the tumor an undifferentiated adenocarcinoma (embryonal carcinoma) (figs. 4 and 5). There was no evidence of spread up the cord and the tunica albuginea was intact. The patient was transferred to this hospital, and on 2 February a left radical retroperitoneal lymph node resection was done. All remaining tissue in the left side of the scrotum was completely removed because an attempt had been made to aspirate this tumor. All the nodes were negative for metastatic cells. The patient made an uneventful convalescence and was discharged home on 14 February. Because the nodes were not involved, x-ray therapy was

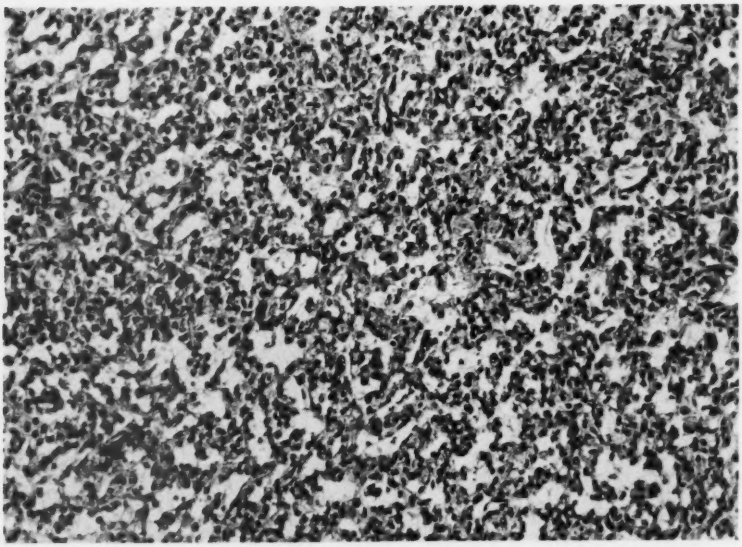


Figure 4 (case 3). Completely undifferentiated pattern of primitive ectoderm in an undifferentiated adenocarcinoma (embryonal carcinoma). (× 110)

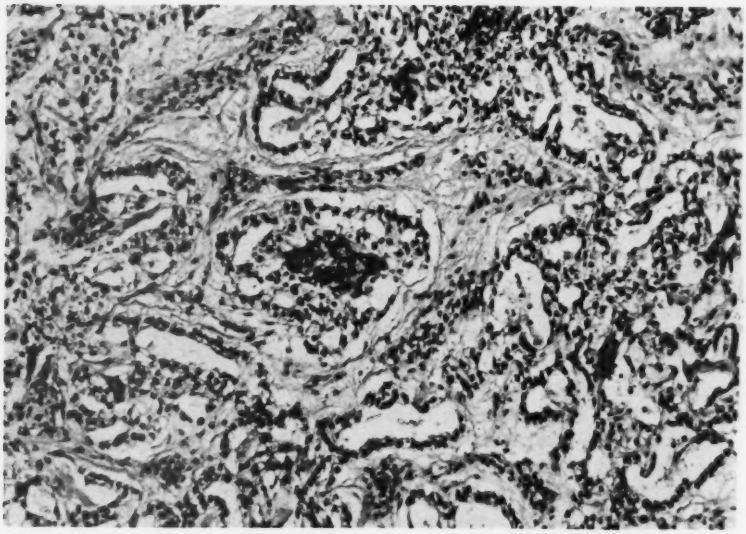


Figure 5 (case 3). Primitive ectodermal cells surrounded by immature mesenchyme arranged in early acinar pattern. Undifferentiated adenocarcinoma. (× 110)

not given. Three months' follow-up has revealed no recurrence and a roentgenogram of the chest reveals no abnormalities.

Comment: It is to be noted that radical retroperitoneal lymph node resection was done in each case. The technic for this was described previously.[8] Inasmuch as there was no evidence of metastases in the retroperitoneal nodes, deep x-ray therapy was not given. It is admitted that according to general standards the survival time is too short to be significant, yet it is believed that these children have an excellent chance to be cured.

SUMMARY

In the past three years, three patients under three years of age and 17 adults who had testicular tumors were admitted to this hospital. This experience suggests that the incidence of these tumors in children is higher than previously estimated.

The four major groups of tumors of the testis, based on their histopathology, are seminoma, tumors of primitive ectoderm (embryonal carcinomas), teratoid tumors (teratoma and teratocarcinoma), and tumors of trophectoderm.

Radical resection of the retroperitoneal lymph nodes should be performed on every patient with malignant disease of the testis, irrespective of age or type of tumor. This was done on three patients, one with a fibrosarcoma of the tunica albuginea, and two with undifferentiated adenocarcinoma.

We now believe that radiation therapy is superfluous when the excised retroperitoneal nodes contain no evidence of metastases and when the primary tumor is not a seminoma. No patients with metastases to the retroperitoneal lymph nodes, except those with seminoma, have been cured by radiation therapy.

REFERENCES

1. Doyle, G. B.: Embryonal carcinoma of testis in infant. *Brit. J. Urol.* 27: 287-291, Sept. 1955.

2. Friedman, N. B., and Moore, R. A.: Tumors of testis; report on 922 cases. *Mil. Surgeon* 99: 573-593, Nov. 1946.

3. Friedman, N. B.: Comparative morphogenesis of extragenital and gonadal teratoid tumors. *Cancer* 4: 265-276, Mar. 1951.

4. Lewis, L. G.: Testis tumors. In Andrus, W. D., and others (editors): *Advances in Surgery.* Interscience Publishers, Inc., New York, N. Y., 1949. Vol. 2, pp. 419-495.

5. Moore, R. A.: Teratoid tumors of testis; (Ramon Guiteras lecture) *J. Urol.* 65: 693-708, May 1951.

6. Kimbrough, J. C., and Morse, W. H.: Treatment of malignancy of testes. *U. S. Armed Forces M. J.* 2: 1353-1355, Sept. 1951.

7. Lewis, L. G.: Radioresistant testis tumors; results in 133 cases; 5-year follow-up. *J. Urol.* 69: 841-844, June 1953.

8. Lewis, E. L.; Johnston, R. E.; Rowe, R. B.; and Kimbrough, J. C.: Retroperitoneal lymph node resection: intercosto-inguinal approach. *J. Urol.* 67: 338-341, Mar. 1952.

416757 O - 57 - 9

Cross Sensitization in Eczematous Contact Dermatitis

WILLIAM J. WAGNER, *Lieutenant, MC, USNR*

THE PROPENSITIES for cross sensitization in allergic eczematous contact dermatitis have been considered by many investigators. Among the original studies of allergic sensitizations were those by Jadassohn[1] on reactions due to topically applied medicaments. Routine and systematic search for allergenic topical medicaments as causal or contributory factors in allergic contact dermatitis and other eruptions was first suggested by Goodman and Sulzberger.[2] These investigators proposed that patients, who on the basis of clinical evidence were suspected of having developed allergic hypersensitivity to one or more topical medicaments, be subjected to patch tests with a therapeutic tray, *i. e.*, a standard series of commonly used topical medicaments. This procedure helps to ascertain with a considerable degree of accuracy any existing allergic sensitizations to these topical agents. The systematic elimination of those topical medicaments that are almost certain to cause aggravation and often also spreading of an existing dermatosis has proved itself to be of the greatest practical importance. One must, however, be aware of the fact that these tests cannot prevent or forecast subsequent development of allergic sensitizations to other topical medicaments.

Bloch's[3] classical study in 1911 on the nature of iodoform hypersensitivity showed that certain cases of multiple sensitizations which might have been classified as polyvalents, although specific, actually represented cross sensitizations among a number of chemically and hence immunologically related compounds. Moreover, his study explained the previously puzzling fact that some patients experienced specific allergic sensitizations to agents which they had never previously encountered.

Cross sensitization has been investigated frequently since Bloch's work, as discussed by Sulzberger.[4] Studies on cross sensitizations among a group of compounds containing aromatic amines as part of their molecule are by no means new, but are of renewed interest at the present time because of the ever-in-

From U. S. Naval Hospital, Philadelphia, Pa.

creasing opportunities for exposures to the aniline derivatives. Cross sensitizations among local anesthetics have been studied for many years and have recently been reviewed by a number of authors (Rothman, Orland, and Flesch[5]; Strauss[6]; Baer and Meltzer[7]).

Within this relatively small group of related compounds several types of cross sensitizations that vary greatly in the width of the sensitization spectrum and are based on different mechanisms have been reported. The chemical groups on which the cross sensitizations were based are the following: (a) aniline (Goodman[8]); (b) an-OH group in the para or meta position on the aminobenzene ring (Schwarzchild[9]); (c) a tertiary amine (James[10]); (d) benzoic acid with a tertiary amine in the side chain (Waldron[11]); (e) esters of para-aminobenzoic acid with secondary or tertiary amines in the side chains (Rothman, Orland, and Flesch); and (f) alkyl esters of para-aminobenzoic acid (Laden and Rubin[12]).

Studies by Phillips[13] on cross sensitizations among certain local anesthetics and sulfonamide drugs revealed that, among subjects suffering from dermatitis due to various sulfonamide drugs, 68 per cent reacted to cutaneous tests with sulfanilamide, 30 per cent reacted to sulfapyridine, 21 per cent to sulfathiazole, 11 per cent to sulfaguanidine, and 7 per cent to sulfadiazine, while 16 per cent reacted to procaine hydrochloride. This shows that in a group of subjects hypersensitive to sulfonamide drugs the incidence of hypersensitivity to procaine hydrochloride is greater than to sulfaguanidine and sulfadiazine. Sulzberger and associates[14] observed cross sensitization to para-aminobenzoic acid in two of eight subjects with dermatitis due to sulfonamide drugs, and one of these subjects also reacted to procaine hydrochloride.

The cross sensitization among paraphenylenediamine and azodyes are of practical importance because of the not infrequent occurrence of dermatitis due to azodyes in nylon stockings, with cross sensitization to paraphenylenediamine as described by Dobkevitch and Baer.[15] This reaction is based on the fact that both substances undergo transformations in the skin which lead to the formation of the same intermediate products. Baer, Leider, and Mayer[16] were able to show that this type of cross sensitization probably also extends to some of the azodyes which in the United States are certified for use in foods, drugs, and cosmetics. The cross sensitization among certified azodyes, aminobenzoic acid, quinones, and paraphenylenediamine is of decided importance clinically but has not been adequately investigated, although an investigation is being pursued by the same workers.

The term "cross sensitization" as employed here refers to the phenomenon in which a given sensitization crosses over among

several chemically related compounds. These cross sensitizations can be explained by the following possibilities of an immunochemical relationship between the primary and the secondary allergens:[17]

1. The primary allergen and the secondary allergen may be so closely related immunochemically (*e. g.*, contain identical allergenic groups) that the sensitized cells cannot differentiate between them, and thus react toward them as if they were identical (group specificity).

2. The primary allergen is converted (reduced, oxidized, et cetera) in the body into an agent which is identical with or so closely related to the secondary allergen that the sensitized cells cannot differentiate between them.

3. The secondary allergen is converted in the body into an agent which is identical with or so closely related to the primary that the sensitized cells do not differentiate between them.

4. Both the primary and the secondary allergens are converted in the body into agents which are either identical or so closely related that the sensitized cells do not differentiate between them.

These possibilities of direct cross sensitizations must be differentiated from indirect cross sensitizations or reactions which are produced by concomitant factors. Thus certain cross reactions[18] may occur when a sensitizing compound contains, in addition to its principal allergen, one or more other substances with allergenic potential (*e. g.*, contaminants) which themselves may give rise to independent sensitizations or elicit dermatitis in already sensitized skin.

CASE REPORT

A 39-year-old man was admitted to this hospital on 7 January 1956 because of right flank pain and hematuria of 30 hours' duration. Past history failed to reveal evidence of previous episodes of abdominal pain, hematemesis, or tarry stools. He had been in the naval service from December 1941. His mother and a sister died of tuberculosis. There was no family history of cancer, diabetes, calculi, or previous skin diseases except that he was told he had exhibited sensitivity to "a sulfa drug" in 1949. The specific sulfa drug was unknown.

Physical examination on admission showed only right flank tenderness producing pain radiating into the right anterior abdominal wall and into the right testicle. Temperature was 98.6°F; pulse, 68; and blood pressure, 120/62 mm Hg. Inguinal hernias were present bilaterally. A roentgenogram of the chest was normal. The white blood cell count, differential, red blood cell count, hemoglobin, and sedimentation rate were reported as being within normal limits. Examination of the urine

sediment revealed numerous red blood cells and 6 to 8 pus cells per high-power field.

On 12 January most of his flank pain had subsided and an intravenous pyelogram was normal with no evidence of a calculus. It was presumed the calculus had passed.

After surgical consultation the patient was transferred to the surgical service for repair of the inguinal hernias. On 10 February a left inguinal hernioplasty was performed under spinal anesthesia, using Pontocaine (brand of tetracaine hydrochloride). On 12 February the patient was noted to have an acute vesicular eruption of the lower half of his back extending onto the buttocks, which was thought by the surgeon and author to be due to Merthiolate (brand of thimerosal) applied in preparation for the spinal anesthesia, but subsequent investigation revealed that tincture of benzalkonium chloride had been used for skin preparation. The rest of the patient's body was involved in an urticaria-like eruption. He was receiving penicillin at the time. The eruption rapidly subsided and on 5 March a right inguinal hernioplasty was performed. Merthiolate was not applied to any portion of his body for preoperative skin preparation. The surgeon used only pHisoHex and water to prepare the abdomen, and the anesthetist used tincture of benzalkonium chloride prior to the spinal anesthesia. Pontocaine was again used as the spinal anesthetic. About 12 hours after the completion of the operation the patient was again noted to have an acute, vesicular, and severely pruritic eruption that rapidly became generalized to most of the body surface, but remained most severe in the area of the application of the tincture of benzalkonium chloride. The eruption subsided in four or five days with the application of continuous wet dressings and a bland drying cream.

After the acute reaction subsided the patient was open-patch tested to three samples of tincture of benzalkonium chloride obtained from stock solutions in each of the main operating rooms, and to undiluted Merthiolate. Twenty-four hours following the patch tests there was noted an acute vesicular eruption at the site of the benzalkonium chloride applications, while at the site of the Merthiolate application there was no reaction whatsoever. Subsequently he was patch-tested in a new site to an *aqueous* solution of benzalkonium chloride and adhesive tape. After 48 hours no reaction was noted to either of these patch tests.

The dye used in the benzalkonium chloride (tincture) is D&C red No. 39, commonly called alba red (ortho-[para-(beta, beta prime-dihydroxydiethylamino)-phenylazo]-benzoic acid). The benzalkonium chloride solution used at this hospital is a 0.1 per cent solution containing alcohol, acetone, distilled water, and 0.02 per cent alba red dye.

On 21 March patch tests to Benadryl (brand of diphenhydramine hydrochloride), sulfadiazine, Benzocaine (brand of ethylaminobenzoate), Pontocaine, Pyribenzamine (brand of tripelennamine hydrochloride)

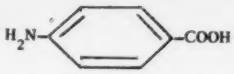
cream, and sun-screen lotion containing sodium para-aminobenzoic acid were applied. The tests were removed 24 hours later because of the known sensitivity to substances with similar chemical structure to the materials being used for testing (fig. 1). There were marked reactions (induration, vesiculation, and erythema) to Benadryl and Benzocaine, plus a decided suggestion of a positive reaction to the sun-screen lotion. No further testing was done at this time, and a rest period was allowed because of the reactions to the tests applied. On return of the patient on 26 March there was noted an acute erythematous, oozing, pruritic, and elevated eruption over the sites of previous reaction to the benzalkonium chloride. This was considered to be a delayed or flare reaction of his previous patch-test eruption. No further testing was done and the bland cream was continued; this eruption cleared very slowly and on 9 April he was sufficiently well for more patch tests to be applied. These patch tests were removed the next day and were read as follows: (1) Pontocaine (2 plus), marked reaction with vesicles and erythema; (2) 2 per cent picric acid (trinitrophenol) (3 plus), marked reaction; (3) 6 per cent benzoic acid (2 plus), moderately positive; (4) 10 mg alba red dye in 50 ml acetone (4 plus), very marked reaction with vesiculation, some pustulation, erythema and induration; (5) paraphenylenediamine (1 plus), mild reaction but definite vesiculation; (6) A-Fil sun screen, no reaction; (7) sulfanilamide (2 plus), moderate reaction; (8) 2 per cent procaine (2 plus), moderate reaction with some vesiculation.

DISCUSSION

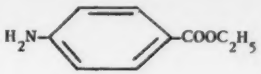
Apparently on the basis of a primary sensitization to a single agent, namely, an unidentified "sulfa drug" taken several years prior to admission, this patient became hypersensitive through cross sensitization to such seemingly diverse materials as para-aminobenzoic acid, certain local anesthetics, sun-screen lotions and creams, certain sulfonamide drugs, and certain azodyes used in dyeing stockings, clothing, foods, drugs, surgical preparation solutions, cosmetics, and gasoline.

The patient's first cutaneous reaction to be observed in this hospital followed the use of tincture of benzalkonium chloride containing alba red dye in preparing the skin area for spinal anesthesia. A more severe reaction followed a second spinal anesthesia, at which time the skin was prepared with tincture of benzalkonium chloride containing alba red dye. Sensitivity to a number of structurally related compounds was later revealed by skin patch tests.

Many commonly used topical preparations are similar in at least part of their molecular structure. When a patient has previously exhibited sensitivity to a preparation, no compound of similar chemical structure should be used if another allergic reac-

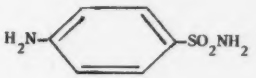


Para-aminobenzoic acid

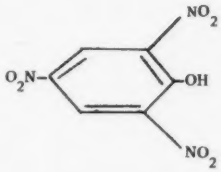


Ethyl aminobenzoate

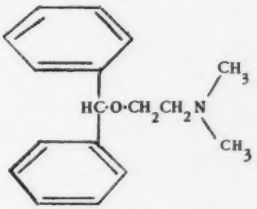
Paraphenylenediamine



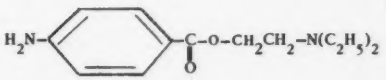
Sulfanilamide



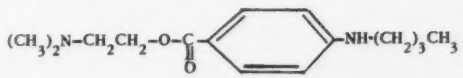
Trinitrophenol



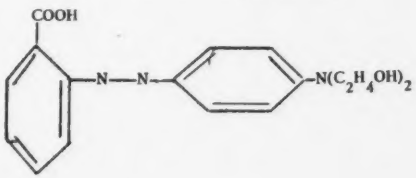
Diphenhydramine hydrochloride



Procaine



Tetracaine hydrochloride



Alba red

Figure 1. Structural relationships of compounds producing reactions in patient.

tion is to be prevented. Increased awareness of this problem makes it possible not only to avoid the primary allergen but, in addition, the immunochemically related (secondary) allergens.

REFERENCES

1. Jadassohn, J.: Zur Kenntnis der medicamentösen Dermatosen. *Verhandl. d. deutsch. dermatol. Gesellsch.* Congress 5: 103-129, 1896.

2. Goodman, J., and Sulzberger, M. B.: Patch tests with therapeutic agents. *Arch. Dermat. & Syph.* 35: 944-945, May 1937.

3. Bloch, B.: Expermentelle Studien ueber das Wesender Jodoformidiosynkrase. *Ztschr. f. exper. Path. u. Therap.* 9: 509, 1911.

4. Sulzberger, M. B.: *Dermatologic Allergy.* Charles C Thomas, Publisher, Springfield, Ill., 1940. pp. 87-128.

5. Rothman, S.; Orland, F. J.; and Flesch, P.: Group specificity of epidermal allergy to procaine in man. *J. Invest. Dermat.* 6: 191-199, June 1945.

6. Strauss, M. J.: Group sensitivity to local anesthetics; confirmation of possibility of its occurrence and demonstration that it does not necessarily always take place. *J. Invest. Dermat.* 8: 403-407, June 1947.

7. Baer, R. L., and Meltzer, L.: Sensitization to monoglyceryl para-aminobenzoate; preliminary report. *J. Invest. Dermat.* 11: 5, July 1948.

8. Goodman, M. H.: Cutaneous hypersensitivity to procaine anesthetics; correlation of hypersensitivity with chemical structure. *J. Invest. Dermat.* 2: 53-66, Apr. 1939.

9. Schwarzschild, L.: Sensibilisierungsversuche aus der Orthoformreihe. *Arch. f. Dermat. u. Syph.* 156: 432-445, 1928.

10. James, B. M.: Procaine dermatitis; report of case and attempt to determine chemical groups responsible for hypersensitiveness. *J. A. M. A.* 97: 440-443, Aug. 15, 1931.

11. Waldron, G. W.: Hypersensitivity to procaine. *Proc. Staff Meet., Mayo Clin.* 9: 254-256, Apr. 25, 1934.

12. Laden, E. L., and Rubin, L.: Specificity of eczematous hypersensitivity to para-aminobenzoic acid butyl ester ("butesin"). *Proc. Soc. Exper. Biol. & Med.* 66: 451-452, Nov. 1947.

13. Phillips, B.: Clinical study of sulfonamide dermatitis. *Brit. J. Dermat.* 58: 213-227, Sept.-Oct. 1946.

14. Sulzberger, M. B.; Kanof, A.; Baer, R. L.; and Lowenberg, C.: Sensitization by topical application of sulfonamides. *J. Allergy* 18: 92-103, Mar. 1947.

15. Dobkevitch, S., and Baer, R. L.: Eczematous cross-hypersensitivity to azodyes in nylon stockings and to paraphenylenediamine. *J. Invest. Dermat.* 9: 203-211, Oct. 1947.

16. Baer, R. L.; Leider, M.; and Mayer, R. L.: Possible eczematous cross-hypersensitivity between paraphenylenediamine and azodyes certified for use in foods, drugs, and cosmetics. *Proc. Soc. Exper. Biol. & Med.* 67: 489-494, Apr. 1948.

17. Baer, R. L.: Examples of cross sensitization in allergic eczematous dermatitis. *Arch Dermat. & Syph.* 58: 276-285, Sept. 1948.

18. Landsteiner, K.: *The Specificity of Serological Reactions.* Harvard University Press, Cambridge, Mass., 1945. p. 197.

Ruptured Omphalocele

ROBERT C. RAY, *Captain, MC, USN*

AN OMPHALOCELE is caused by persistence of the normal fetal condition in which the mid-gut is transferred temporarily into the base of the umbilical cord. The protrusion, which occurs in the fifth to twelfth week, probably results from an inequality of growth between the abdominal parietes and the more rapidly developing abdominal organs. During this period the rate of growth of the abdominal cavity accelerates, and usually by the tenth or eleventh week it is of sufficient size to reaccommodate the displaced viscera.[1]

Sometimes the inequality in size between abdominal cavity and abdominal viscera persists, and the intestines and a portion of the liver remain in the base of the umbilical cord. Other organs that occasionally are protruded include stomach, spleen, pancreas, and transverse and descending colon. Eventration of liver and intestines occurs in about 1 in 10,000, and herniation of intestines alone in 1 in 5,000 births.[2]

When a child is born with this condition, the displaced abdominal contents are covered only by a translucent sac through which the organs can plainly be viewed.[3] Occasionally the sac is ruptured in utero or during parturition.

Infants with omphalocele must undergo prompt and radical repair if any hope is to be held for their survival. Optimum conditions are presented if the sac is intact and small, and the peritoneal cavity sufficiently developed to permit a one-stage procedure without overcrowding. Trying to put "two pounds in a one-pound bag" will result, as observed by Denman and Lomas,[4] only in respiratory embarrassment, compromise of venous return, or possibly a mechanical obstruction of the intestinal tract. When a large sac must be returned to a small, underdeveloped peritoneal cavity, a two-stage procedure is necessary to create, by undermining, skin flaps which are large enough to cover the protruded organs. Even with this lifesaving measure, the skin must sometimes be closed under such tension that some embarrassment of vital function occurs.

From Station Hospital, U. S. Naval Station, Kodiak, Alaska. Capt. Ray is now assigned to U. S. Naval Hospital, San Diego, Calif.

When the sac is ruptured at birth, the hazard of infection is superimposed upon an already precarious situation, and prior to the advent of chemotherapy none of these infants survived the peritonitis which ensued. When rupture occurs during delivery, the outlook is more favorable than when it occurs in utero. Rupture during parturition, as in the case reported by Lane,[5] still presents the sac content in a somewhat pristine state, whereas a gut that has been constantly bathed in amniotic fluid becomes thickened and edematous. Such a case was described by Bell and Brown.[6] This further increases its natural volume and makes the problem of replacement or cover more difficult.

CASE REPORT

On 4 July 1956 a 17-year-old primagravida was delivered of a full-term, female infant weighing 5 pounds 10 ounces. The prenatal course had been uneventful and uncomplicated. The patient was delivered by low forceps after a 6-hour labor.

At birth it was noted that the infant had a large ruptured omphalocele. The coils of gut were swollen and had a darkly reddened somewhat granular appearance. They were matted together and it appeared that rupture had taken place in utero and some time previously.

The infant was cyanotic and had a weak, feeble cry. No other gross abnormalities were evident. The eventrated organs were covered with a warm, moist, sterile dressing, and a small dose of caffeine and sodium benzoate was administered. The stomach was intubated with a No. 12 French catheter, and the infant was placed in an incubator in an oxygen-enriched atmosphere.

Three hours after birth, under light, open-drop ether anesthesia, the dressings were removed and the coils of gut gently lavaged with physiologic saline solution. It was found that a portion of stomach, the duodenum, the mid-gut, and the major portion of the hind-gut were eventrated through a musculofascial defect about 8 cm in diameter. Only a small remnant of sac was in evidence. This was attached about the umbilical vessels, which lay in the left mid-portion of the defect. The loops of the gut were grossly thickened and edematous. There was no evidence of volvulus or of atretic, stenotic, or duplicated portions of the intestinal tract.

Only a small portion of the viscera could be replaced in the peritoneal cavity. Accordingly, flaps were fashioned by extensive undermining and the skin was closed under a moderate amount of tension.

The infant reacted well and was returned to her incubator in good condition, where she was continued on gastric suction and started on an intensive course of penicillin and dihydrostreptomycin sulfate.

Continuous gastric suction was maintained for 12 hours, at the end of which time the tube was removed because of temporary respiratory em-

barrassment. Thereafter, the infant was intubated and the gastric content aspirated every four hours.

Fluids consisting of equal parts of 5 per cent dextrose in distilled water and of normal saline solution were administered parenterally in the amounts of 20 ml per pound of body weight per 24-hour period. This kept the infant a little on the "dry side," but true dehydration was never a problem under this regimen.

Beginning on the second day, small amounts (60 ml) of 5 per cent dextrose were given by gavage following gastric aspiration, and shortly thereafter this was replaced by half-strength house formula.

On the fourth day high-pitched peristaltic sounds were audible. Oral feedings in small amounts (from 30 to 45 ml) were started and were avidly taken by the infant. A portion of the feeding would sometimes be propulsively vomited a few minutes after ingestion. Following emesis the infant would be refed and would nurse eagerly. The possibility of a high mechanical obstruction was considered, but the general condition of the infant remained fairly good, and it was believed that all these manifestations could be explained by the slow recovery of tone of the thickened, edematous bowel. Although the vomiting persisted to some extent until the tenth day, some of the feeding was being retained.

Small, twice daily, normal saline enemas were started on the fourth day, with recovery of much meconium and thick, ropy, mucoid material. On the tenth day the infant began to pass meconium spontaneously, and two days later the first stool containing digested milk curds appeared. Following this, progress was rapid and the infant was discharged home in the fourth week. Weight at time of discharge was 7 pounds and 4 ounces.

Figure 1, taken on the day of discharge, shows the large ventral herniation and the crusted but firmly healed operative wound. Unfortunately, preoperative photographs were technically unsatisfactory.

Figure 1. Photograph taken in the fourth week. Note the large ventral herniation and the crusted but firmly healed operative wound.

The child has been seen periodically as an outpatient. She continues to thrive and gain weight. No other congenital defects have been discovered to date. It is estimated that at her present rate of development she will be ready for the second-stage operation in from 12 to 15 months.

REFERENCES

1. Davis, L. (editor): Christopher's *Textbook of Surgery.* 6th edition. W. B. Saunders Co., Philadelphia, Pa., 1956. pp. 530-533.

2. Nelson, W. E. (editor): *Textbook of Pediatrics.* 6th edition. W. B. Saunders Co., Philadelphia, Pa., 1954. p. 290.

3. Gross, R. E.: *The Surgery of Infancy and Childhood.* W. B. Saunders Co., Philadelphia, Pa., 1953. pp. 406-427.

4. Denman, F. R., and Lomas, R. D.: Ruptured omphalocele with duodenal obstruction. *M. Rec. & Ann.* 47: 694-695, Nov. 1953.

5. Lane, W. H., Jr.: Hernia in umbilical cord; clarification and report of case. *New England J. Med.* 253: 466-467, Sept. 15, 1955.

6. Bell, L. S., and Brown, H. A.: Ruptured omphalocele complicated by laceration of stomach. *J. Pediat.* 44: 79-84, Jan. 1954.

BACK TO THE BOTTLE

"No compelling evidence of physiological advantage or disadvantage attending the early feeding of solid foods has appeared. One thing seems to have been shown—the infant's digestion and assimilation are much more adaptable than was once thought; but, it is an open question whether we should take advantage of this fact. In an age in which civilization is constantly chipping away at the simple, uncomplicated animal aspects of human life, there seems reason to protest against any hurry to relinquish the natural suction of one warm liquid food in favor of the cultivation of a battery of acquired tastes by the unnatural means of spoon and cup."

—CLEMENT A. SMITH, M. D.

in *Journal of the American Medical Association*

p. 729, June 23, 1956

A MESSAGE FROM THE A. M. A.

Since July 1952, the Council on National Defense of the American Medical Association has conducted an opinion survey among physicians being released from active military service. The questionnaire used in the survey is primarily designed to obtain pertinent data based on the physician's observations and opinions while in the Armed Forces, concerning the utilization of physicians and the medical staffing conditions in the uniformed services. The questionnaire also calls for comments and suggestions of ways to further improve the medical services as well as ways and means whereby organized medicine can be of greater assistance to military physicians.

The following report is based on the returns received in 1955. During that 12-month period, the Council sent out 3,651 questionnaires, of which 2,191 were completed and returned. This represented a 60 per cent response.

Date of Graduation from Medical School. About half of the physicians replying (1,108) were graduated from medical school between the years 1945-1949; the second largest group, 503 or 23 per cent, graduated in 1950 or later. There were 449 or 20 per cent graduating between the years 1940-1944. Less than 2 per cent graduated before 1940. Eighty-nine failed to indicate the year of graduation from medical school.

Years of Internship and Residency. As was the case in the summary report covering the last six months of 1954,[1] the largest group replying to this question (497 or 23 per cent) had completed three years of residency training, while the second largest group (450 or 20 per cent) had had no residency training at the time of entrance on active military duty. There were 369 or 17 per cent with one year of residency training; 347 or 16 per cent with two years; and 268 or 12 per cent with four years. Those who failed to answer the question totaled 260.

Occupation at Time of Entering Service. The largest groups of physicians who served in the Army (28 per cent) and the Air Force (32 per cent) were engaged in general practice at time of

---

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense. —*Editor*

entrance on active duty while the largest group in the Navy (26 per cent) were in residency training. The last summary report reflected the largest groups in all three services were engaged in residency training prior to active military service. In the Army group, specialty or industrial practice was second, while in the Navy it was general practice, and in the Air Force it was residency training. There were 12 per cent of the Navy group, 10 per cent of the Air Force, and 5 per cent of the Army engaged in internship training immediately prior to entrance on active duty.

Number of Physicians Holding Board Certificates. Of the 290 persons responding to this question, 128 holding specialty board certificates were in the Army, 93 were in the Navy, and 69 were in the Air Force. The specialties covered over 19 different fields of which the largest was internal medicine, the second largest was pediatrics, and the third largest was surgery. It is interesting to note that in the previous summary report,[1] surgery was first, followed by pediatrics and internal medicine. By branch of service, a total of 25 per cent of those responding in the Army and Navy and 17 per cent of those in the Air Force had specialty board certificates.

Reserve Status. Of the 2,191 physicians reporting, 764 indicated that they retained their reserve commissions, while 1,407 resigned. Twenty did not respond. In the Army, 242 retained their commissions and 722 resigned. The Navy had 351 retaining and 182 resigning, and the Air Force had 171 retaining and 503 resigning.

Distribution by Rank at Time of Discharge. The majority of physicians in the Army and Air Force held the rank of Captain at the time of their release from active military duty; in the Navy, the majority were in the rank of Lieutenant (junior grade). Over 97 per cent of the reporting physicians, or 2,135, answered this question. The survey indicated that approximately 27 per cent of those who reported were in the lowest rank, while 64 per cent held the rank of Captain or Lieutenant (Navy). There were about 7 per cent with the rank of Major or Lieutenant Commander and higher.

Government Medical Education Received. Of the 2,191 physicians responding, 1,153 stated that they had received assistance from the Government in their medical education. There were 1,013 who indicated no governmental assistance, and 25 failed to answer the question. The largest single group receiving governmental assistance was under the Navy V-12 Program. The next largest groups were under the Army Specialized Training Program and the GI Program.

Training Received While in Service. There were 1,814 physicians who answered this question concerning the types of military medical training received while on active duty, while 377 physicians did not respond to the question. All of those responding indicated that they had received additional training or experience in service schools; 916 in the Army, 317 in the Navy, and 581 in the Air Force. The Medical Field Service School accounted for the largest number, with the School of Aviation Medicine accounting for the second largest group. In the Army group, 87 per cent received the Basic Course training of the Medical Field Service School, while 13 per cent in the Navy and 41 per cent in the Air Force attended the School of Aviation Medicine.

The second part of the results of this latest opinion survey will be reported in the next issue of this *Journal*.

REFERENCE

1. Message from the A. M. A. *U. S. Armed Forces M. J.* 6: 1535-1536, Oct. 1955.

Rx NOSE DROPS

Do not prescribe nose drops unless they are truly indicated. If they are indicated be sure to use a preparation that does not disrupt the physiology of the nasal mucosa and impair its native ability to combat infection. Oils, aromatic irritants and antiseptics are unphysiologic. Nose drops should be aqueous, isotonic, and slightly acid. Any doctor can write an extemporaneous prescription for nose drops that fulfills these requirements, and such a medication is superior to any of the proprietary preparations for most patients.

—JESSE D. RISING, M. D.
in *Missouri Medicine*
p. 776, Sept. 1954

NAVY SURGEON GENERAL RECEIVES FRENCH MEDAL OF HONOR

Rear Admiral Bartholomew W. Hogan, Surgeon General of the U. S. Navy, was decorated on 10 January 1957 with the "Medaille de vermeil," the Medal of Honor of the French Naval Medical Service.

Rear Admiral Louis Mornu, Naval Attaché at the French Embassy in Washington, D. C., presented the medal in recognition for the distinguished services Admiral Hogan rendered to the French Navy Medical Corps.

In accepting the decoration Admiral Hogan stated that to receive this honor from such a great nation was truly a rare privilege and a proud moment not only for him but for the Medical Department of the U. S. Navy. Official acceptance of the medal will require Congressional approval.

OFFICERS CERTIFIED BY SPECIALTY BOARDS

Supplementary Listing

According to information from the Offices of the Surgeons General of the military medical services, the following regular Medical Corps officers have been certified by the boards indicated since the listings published in previous issues of this *Journal*.

American Board of Pediatrics

Charles W. Reiquam, Capt., USAF

American Board of Dermatology and Syphilology

Harold K. Alsabrook, Lt. Comdr., USN
Edward G. Hurlbut, Capt., USN

American Board of Radiology

Byron G. Brogdon, Capt., USAF
Walter F. Hansen, Comdr., USN
Marshall W. Olson, Lt., USN
Harwood N. Sturtevant, Maj., USAF

American Board of Internal Medicine

Frank M. Bryan, Lt. Comdr., USN
Arthur R. Errion, Capt., USN
Herschel E. Richardson, Capt., USN

American Board of Ophthalmology

Wayne L. Erdbrink, Lt. Comdr., USN
Walter Patterson, Capt., USN

American Board of Otolaryngology

Louis P. Ballenberger, Capt., USN
Peter J. Giotta, Capt., USN
Robert L. King, Jr., Comdr., USN
Bentley A. Nelson, Lt., USN

American Board of Surgery

James B. Anderson, Maj., USAF
Bruce F. Baisch, Comdr., USN
Howard A. Baker, Comdr., USN
Daniel W. Boone, Capt., USN
Carl A. Broaddus, Jr., Lt. Comdr., USN
Donald J. Doohen, Lt. Comdr., USN
Alexander C. Hering, Comdr., USN
James A. Kaufman, Comdr., USN
Edward W. Pinkham, Capt., USN
Paul G. Richards, Capt., USN
Charles E. Rogers, Comdr., USN
Edward J. Rupnik, Lt. Comdr., USN
George W. Russell, Capt., USN
Melvin B. Sullivan, Lt., USN

American Board of Anesthesiology

Donald R. Buechel, Lt., USN

American Board of Neurological Surgery

Gale G. Clark, Comdr., USN

416757 O - 57 - 10

American Board of Preventive Medicine

Founders Group in Occupational Medicine

Harry J. Alvis, Capt., USN
Theodore C. Bedwell, Col., USAF
Albert R. Behnke, Capt., USN
Gerald J. Duffner, Capt., USN
Oscar Schneider, Capt., USN
Howard K. Sessions, Capt., USN
Edward J. Tracy, Brig. Gen., USAF
Oscar D. Yarbrough, Capt., USN

American Board of Thoracic Surgery

James D. King, Capt., USN

PREVENTIVE MEDICINE COURSE FOR MEDICAL OFFICERS

The Military Preventive Medicine Course (Course 8-0-37) that will begin on 3 September 1957 at Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C., presents interesting opportunity for medical officers of the Armed Forces.

The course concerns the prevention and control of disease and injury in the military as well as in civilian communities. Emphasis is placed on the global aspects of military preventive medicine, with particular attention to health problems of the arctic and tropical areas. Covering 48 weeks of academic studies, the course includes field trips or investigations, and individual or committee studies. Selected Army graduates of the course will be eligible for entry into the Army's recently announced preventive medicine residency program.

The American Board of Preventive Medicine has approved this course as an equivalent of its requirement for the Master of Public Health degree. A bill is now before Congress which would authorize the granting of postgraduate degrees, including that of Master of Public Health, by the Walter Reed Army Institute of Research.

Regular Army Medical Corps officers or qualified physicians who accept commissions in the Regular Army are eligible for the course. Qualified officers from the Navy and Air Force medical services, the U. S. Public Health Service, and representatives of other governmental agencies may be admitted by mutual agreement between the Army Surgeon General and the chief of the government agency desiring to participate. Civilian physicians may apply by writing to The Surgeon General, Department of the Army, Washington 25, D. C., Attention: Personnel Division. Military personnel should apply through appropriate channels.

Reviews of Recent Books

OFFICIAL HISTORY OF THE CANADIAN MEDICAL SERVICES, 1939 - 1945, Volume One: Organization and Campaigns. Edited by *W. R. Feasby*, M. D. 568 pages; illustrated in color with paintings and photographs by Canadian War Artists and Photographers. Maps drawn by Captain *C. C. J. Bond*. Published by Edmond Cloutier, C. M. G., A. O., D. S. P., Queen's Printer and Controller of Stationery, Ottawa, Ontario, Canada, 1956. Obtainable from the Superintendent of Government Publications, Department of Public Printing and Stationery, Ottawa, Ontario, Canada. Price $5 postpaid.

The medical administrative histories published through the past decade have had varying degrees of merit, but the present volume would seem to surpass them all. Except for one or two weaknesses, it is a brilliant example of how to write military medical history.

The treatment of the subject matter appears to be objective and fairly presented. The historian treats equally the strengths and the weaknesses of the medical services and their effect upon the war effort. Particularly significant from the organizational and administrative viewpoint are the opening chapters and the later chapters beginning with Chapter 19 through the remainder of the volume.

Under the able editorship of Dr. W. R. Feasby, Canadian Medical Historian, and his associates, this volume—one of two—treats the Canadian Medical Services in World War II. The Royal Canadian Army, the Royal Canadian Navy, the Royal Canadian Air Force, and the Royal Canadian Dental Corps, along with the contributions of the civilian services connected with the medical aspects of the war effort, are described in terms of medical organization and development to support the military mission in the many campaigns of World War II. Large-scale topics treated include those of manpower, procurement, and assignment of medical personnel. The narrative carries through until the reader is aware of how these large-scale problems had tangible meaning in terms of winning or losing a battle.

Thus, never are functional problems isolated from the military framework of command and operations insofar as the Mediterranean and European Theaters of Operations are concerned. Beginning with background chapters about the military medical service on the eve of war and the status of mobilization plans, the volume traces the overseas movement of troops and follows them campaign by campaign through the Dieppe Raid, the Sicilian Campaign, the Invasion of Normandy, the Rhineland Offensive, and the Final Phase and Occupation. Accompanying this extensive narrative treatment are beautifully executed maps and illustrations in color, which this reviewer has not seen in any other medical history of the period.

The one weakness is Chapter 18, "Hong Kong" a three-page summary chapter which represents the only treatment of Pacific warfare. Equally disappointing is the fact that there is no mention of the China-Burma-India Theater except briefly on page 570.

Perhaps the serious student, comparing the medical services of the Allies, would also like to know in more detail the types of documents on which the historian has based his narrative.

This volume, together with the previously published volume on clinical medicine, completes the official historical record of the Canadian Medical Services. It is a record that all serious students of medical history—whatever nationality and whatever service—can study with rich reward. It is a volume that reads equally well to the student of military history. —*MAE M. LINK, Ph. D.*

BOTANY, by *Paul Weatherwax.* 3d edition. 509 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $5.75.

This book was first printed in 1942 as a text for a basic collegiate course in general botany. In the present edition, errors have been corrected and difficult sections clarified.

The work is divided into two parts, the first dealing with general plant morphology and physiology. Structure, nutrition, growth, photosynthesis, reproduction, ecology and plant communities, and economic botany are well covered. Particularly good are chapters on dormancy and seed dispersal, heredity, and evolution. The second part describes the various classes of plants, including the cryptogams, with short notes on botanical history and plant fossils.

The numerous illustrations are clear and are so placed in relation to the text that reference to them is easy, a desirable feature sometimes not found in scientific books. There is a glossary of over 1,200 definitions and a useful index. The book is an excellent text for premedical and pharmacy courses.—*LOUIS H. RODDIS, Capt., MC, USN (Ret.)*

THE HABIT OF TOBACCO SMOKING, by *W. Koskowski,* M. D. 292 pages. Staples Press Limited, London, England, Publishers. Distributed in U. S. A. by John de Graff, Inc., New York, N. Y., 1955. Price $5.

This book is divided into two parts. Part I (historical review) describes the discovery of tobacco, the forms of tobacco used, and the various customs and practices associated with the tobacco habit that have evolved through the years to the present time. The great significance that the use of tobacco has had on the economic, psychologic, biologic, and social development of society is described. The statistics presented emphasize clearly the staggering economic importance of tobacco.

Part 2 (the action of tobacco and its compounds on the human organism) reviews present-day knowledge of the action of tobacco, broken down into the various active principles and their action on the

systems of the body. The data given are factual and the author presents these for review without crusading for or against the use of tobacco. He has been very objective in his presentation, and to those physicians who wish a very clear and concise summary of the influence of tobacco under various conditions, this book is recommended. For those physicians who have followed only radio, television, and newsprint comments on the relationship between tobacco and malignant disease, this book presents a digest of the evidence available, and should serve to crystallize their thoughts on the subject. This book will give the busy physician factual ammunition to better answer the many questions asked by patients. Dr. Koskowski also points out the many channels of experimentation which are still open to investigators and emphasizes the tremendous problems yet to be answered.

The style of the book is light and pleasant, and the statistics are well placed. This book should appeal to physicians in all major specialties of medicine.—*PAUL C. LeGOLVAN, Lt. Col., MC, USA*

BIOCHEMISTRY FOR MEDICAL STUDENTS, by *William Veale Thorpe*, M. A. (Cantab.), Ph. D. (Lond.). 6th edition. 542 pages; 48 illustrations. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $6.75.

Initial, brief chapters of this book on the physicochemical principles pertinent to biochemistry are followed by a presentation of the fundamental chemistry of the major categories of foods, animal pigments, enzymes, and of oxidation and reduction. Subsequent chapters are devoted to the composition of blood, tissues, and excretory products, the biochemistry of absorption and digestion, and the intermediary metabolism of carbohydrates, lipids, and proteins. This partial inventory will serve to identify the classical pattern of a biochemistry text intended for the medical student. Like its predecessor, the current edition has the virtue of clarity of language and of readability applied to an extremely large amount of diverse subject matter.

The volume contains a brief but apt chapter on the use of isotopes in biochemical studies. Similar attention is accorded the metabolic interrelationships and syntheses occurring in vivo. Separately and together, these chapters should facilitate the student's transition from the relative security of his textbook to the less familiar terrain of the current literature in biochemistry and physiology. Equally welcome is the chapter dealing with "detoxication" processes which Thorpe entitles and develops as the metabolism of foreign organic compounds.

The treatment of nutrition and of related topics is unusually extensive, although the references to feeding patterns and to costs of foodstuffs in Great Britain might be expected to have a diminished meaning for the American reader. The chapter on hormones is very nearly identical with that which appeared in the previous (fifth) edition. Reasonably sufficient as an introduction to the vast field of hormone

chemistry, this chapter nevertheless fails to convey the significance of hormonal interrelationships in the intact organism.

The author has made excellent use of diagrammatic representations to summarize cardinal metabolic pathways, *e. g.*, the tricarboxylic acid cycle and interrelationships in the metabolism of proteins, fats, and carbohydrates. In the presentation of tables and figures, the book is exemplary. The layout of the many formulas used is particularly effective and constitutes an invitation to learning.

—THADDEUS J. DOMANSKI, Col., USAF (MSC)

THE YEAR BOOK OF MEDICINE (1956-1957 Year Book Series). Part I. Infections, by *Paul B. Beeson,* M. D. Part II. The Chest, by *Carl Muschenheim,* M. D. Part III. The Blood and Blood-Forming Organs, by *William B. Castle,* M. D. Part IV. The Heart and Blood Vessels and the Kidney, by *Tinsley R. Harrison,* M. D. Part V. The Digestive System, by *Franz J. Ingelfinger,* M. D. Part VI. Metabolism, by *Philip K. Bondy,* M. D. 744 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.75.

In this era of increasing abundance of medical literature and the tendency to condensation, the Year Books have been timely and valuable. This volume continues in the successful pattern of its predecessors by providing excellent abstracts of the world literature prepared by recognized authorities on infections, the chest, the blood and blood-forming organs, the heart and blood vessels, the kidney, the digestive system, and metabolism. Included as always are many sagacious and often pungent annotations by the editors, a comprehensive index so often lacking in medical books, and numerous illustrations, the latter of a much higher quality than heretofore seen in this series.

Although in no way a substitute for medical literature, as such, by reason of necessary brevity, these groups of abstracts permit the reader to keep up to date in broad subspecialty fields that may lie outside his current experience. The helpfulness of the Year Books of Medicine to the physician preparing for specialty board examinations is becoming legendary.

The general practitioner as well as the internist will profit by having this volume close at hand. It is a real bargain.

—ROBERT K. MOXON, Comdr., MC, USN

SURGERY OF THE HAND, by *Sterling Bunnell,* M. D. 3d edition. 1,079 pages; 1,047 illustrations and 9 color plates. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $22.50.

This text is again revised in a thorough manner and brought up to date with the recent advances in this specialized field of surgery. The revision enlarges the book by some 130 pages and includes additional text and illustrative material. In addition, there are revisions in the older material as well, which makes for better readability.

This book is unique in medical literature. It is the only complete text on surgery of the hand in publication; indeed, little more can be

learned through outside reading. The material is well organized and carefully presented, and is based upon the vast personal experience of the author and his associates. It is highly recommended to all who might be called upon to treat hand injuries, and should be required reading for those in surgical training whose specialty involves the hand, namely the plastic surgeon, neurosurgeon, general surgeon, and certainly the orthopedist.—*STERLING J. RITCHEY, COL., MC, USA*

THE CLINICAL PSYCHOLOGIST, by *William A. Hunt.* Ph. D. 206 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $5.50.

The author is chairman of the department of psychology and lecturer in psychiatry at the medical school of Northwestern University. He is, thus, adequately prepared to discuss the main theme of his subject, namely, the relationship between medicine and psychology. Without mincing words he lays bare the central problem of psychologic practice, namely, should the qualified clinical psychologist do psychotherapy?

By exploring definitions and by giving a careful analysis of the problem, the author has made a major contribution. Most clinical psychologists are seriously occupied with this problem, and the book is believed to be essential reading for all of these. Students who plan to enter the field of clinical psychology should be interested in reading Dr. Hunt's point of view, because their appraisal of a career in psychology may be inadequate without this realistic reminder of the presence of controversies in the field—controversies about which not much is said in the classrooms. Above all, psychiatrists, psychoanalysts, physicians, and social workers will find the volume helpful in understanding the clinical psychologist and his approach to his work.

Besides the major emphasis, the book describes the training of clinical psychologists and mentions the commonly used psychologic technics. Some psychologists would not agree with the author's remarks on Freud. Nor would all psychologists agree on the role Dr. Hunt has assigned to diagnostic testing in the evaluation of the clinical psychologist's work. This book is worth reading by all those interested in mental health, although the thoughtful reader will not always agree with the author.—*THEODORE C. KAHN, Maj., USAF (MSC)*

THE MANAGEMENT OF MENSTRUAL DISORDERS, by *C. Frederic Fluhmann,* M. D., C. M. 350 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $8.50.

In this volume, Dr. Fluhmann has succeeded in presenting an oft misunderstood subject in a clear-cut, direct manner that should help both the practitioner and student in handling the many patients who present themselves for the care and treatment of menstrual disorders.

Controversial problems are covered in such a way as to inform the reader of the various viewpoints, allowing him to form his own impres-

sion and enabling him to follow up the particular subject by presenting a fairly complete, well-selected list of references in the bibliography at the end of each chapter. The role of the gonadotrophic and steroid hormones in menstruation is discussed in an easy manner conducive to sound understanding of the role they play in initiating and discontinuing the menstrual function.

The last chapter is an up-to-the-minute review of modern-day clinical usage of the sex hormones, with a well-outlined presentation of the numerous leading commercial preparations that stresses the routes of administration, usual accepted dosage levels, and the product's trade name and manufacturer.—*MORRIS M. RUBIN, Capt., MC, USN*

CLINICAL EXAMINATIONS IN NEUROLOGY, by Members of the Section of Neurology and Section of Physiology, *Mayo Clinic, and Mayo Foundation for Medical Education and Research,* Graduate School, University of Minnesota, Rochester, Minn. 370 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

This book deals with the systematic presentation of neurologic examination as practiced by the members of the sections of neurology at the Mayo clinic. The compilation of a book on the neurologic examination is extremely difficult as many tests that are included in the examination by some neurologists are preferred to others, which are sometimes better known. Nevertheless, in this work the reviewer feels that the authors have done an outstanding job in selecting the most significant methods of testing for manifestations of neurologic dysfunction. This book is not intended to be an esoteric chronicle of the more obscure manifestations, but rather a practical guide to the student, to the intern, and to the beginner in neurology interested in learning convenient office procedures which will aid in the evaluation of neurologic conditions. In this respect this book is outstanding.

The authors have selected tests concerning which there is general agreement among most neurologists as to their value. The methods are briefly and concisely explained and are augmented by statements as to the functional significance of the normal or abnormal manifestations. The authors have taken great pains to eliminate controversial material and have done a very skillful job of editing this volume. While it offers little that is new to the specialist, there are few specialists who would not feel that a perusal of the volume was a rewarding experience, representing as it does an orderly treatise on the neurological examination. Only a very few adverse criticisms can be leveled at the work. Perhaps one might be the numerical gradation of reflex activity and of sensory response in the clinical neurologic examination.

This volume is recommended to the practicing physician who maintains an interest in neurologic conditions, and to residents or fellows undergoing training in the specialty of neurology.

—*ROY E. CLAUSEN, Jr., Lt. Col., MC, USA*

CHEMOSURGERY IN CANCER, GANGRENE AND INFECTIONS, Featuring a New Method for the Microscopically Controlled Excision of Cancer, by *Frederic E. Mohs*, B. Sc., M. D. 305 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $13.50.

This monograph represents 25 years' experience by a singularly zealous worker. Almost single-handedly he has fostered the development of this very controversial method of cancer treatment. The method, which he calls chemosurgery, consists of chemical fixation of the tumor in situ with zinc chloride solution, and staged surgical excision with repeated microscopic examinations of the tissue in the bed of the lesion to assure complete removal.

The caustic treatment of neoplasms goes back to antiquity. In the last century many quacks in this country were infamous for their misuse of caustics in cancer. However, Doctor Mohs' real contribution, which removes his technic from such a class, in his histologic control of the process. He has developed considerable skill in histologic technics. Frozen tissues are studied right in the clinic upon removal, in order that the proper orientation of the sections can be made. The microscopic extension of cancer beyond its grossly visible or palpable extent can then be studied.

His wide application of the method is well documented by numerous excellent photographs, case histories, and end-result statistics. In addition to squamous and basal cell carcinoma of the skin, he treats carcinoma of the lip, accessory nasal sinuses, larynx, parotid, penis, vulva, et cetera. Perhaps most controversial is his chemical cautery treatment of melanomas and pigmented nevi. Here again, his results have been excellent.

The author has published numerous papers containing much of the material in the book. His material is presented precisely and quite convincingly. One wishes that such ability, high motivation, and sincerity could be devoted to a more challenging aspect of cancer therapy.

This book will be of value for medical libraries as a definitive work in this limited field.—*ROALD N. GRANT, Capt., MC, USN*

CLINICAL ROENTGENOLOGY, Volume IV, The Digestive Tract, the Gall Bladder, Liver and Pancreas, the Excretory Tract and Special Studies Emphasizing Differential Considerations, by *Alfred A. deLorimier*, M. D., *Henry G. Moebring*, M. D., and *John R. Hannan*, M. D. 764 pages; 1,112 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $24.50.

This readable, clear, concise, and beautifully illustrated volume is a worthy contribution to the literature. It is not designed for detailed study, but rather for quick, balanced reference. If one desires to pursue any subject further, an adequate bibliography is provided at the close of each chapter.

The volume is free of padding or extraneous material, and the approach to each subject is objective and concrete. The illustrations are superior reproductions of original radiograms with ample specific annotations. The brief but accurate references to embryology, anatomy, and physiology serve to refresh the reader's memory with the application of these basic sciences to the pathologic condition under consideration.

In reviewing a book so replete with information, it is difficult to appraise critically one section against another. Those sections dealing with the digestive and excretory tracts are impressive.

One of the most valuable aspects of this book is the frequent reference to differential diagnosis with the clinical and laboratory relationships. The choice of the title, *Clinical Roentgenology,* is good, for no work has emphasized more clearly the role of the radiologist as a practicing physician.—*ALLAN B. RAMSAY, Col., MC, USA*

ATHLETIC INJURIES, Prevention, Diagnosis and Treatment, by *Augustus Thorndike,* M. D. 4th edition. 252 pages; 113 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price $4.50.

The purpose of this small monograph is to present the problem of the prevention, diagnosis, and treatment of injuries received in American college sport. This edition includes new drawings to elucidate the technic of applying supportive strappings and bandages.

The first section of the book contains an interesting historical résumé of the origin of medical supervision of college athletics and its results, with a discussion on physical fitness and fatigue. The second section deals with the different types of trauma and their treatment. The author states: "This chapter will not go into detail as to the proper methods of fracture therapy, as many textbooks cover this field adequately." This applies equally to his discussion of other types of treatment, which might be appropriately included in the preface. He does emphasize the necessity of open reduction of ankle fractures "whenever restoration of the joint to normal cannot be accomplished by conservative methods."

The third section deals with each anatomical region and is probably intended as a reference. The author's thoughts on knee injuries are at variance with those of many others. Tabulating 356 injuries to the medial collateral ligament alone, he enumerates only nine cases in which such an injury was combined with injury to the anterior cruciate! His treatment of knee ligament "sprains" rightly emphasizes the prevention of quadriceps atrophy but denies the efficacy of plaster fixation or operation except in severe cases. However, he admits that cases treated in this manner always have a residual laxity of the ligament.

The illustrations of the technics of applying supportive strappings are well done and lucid.—*WILLIAM S. STRYKER, Comdr., MC, USN*

THE INITIAL MANAGEMENT OF THORACIC AND THORACO-ABDOMINAL TRAUMA, by *Lawrence M. Shefts*, M. D. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Thoracic Surgery Division, Editor: *Brian B. Blades*, M. D. 121 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $6.50.

This short, well-written monograph of 121 pages contains most of the essentials required for the management of thoracic and thoracoabdominal trauma. The author, in addition to his vast personal experience in this field, has quoted other equally experienced surgeons.

Particularly stimulating is the author's emphasis on adequate resuscitation before any ill-advised major surgery is undertaken. Many such cases, having been adequately resuscitated, are found not to require operative interference. Along this line, Dr. Churchill's remarks in the foreword are very apropos concerning "panic decisions" and "stampedes to the operating room" as well as "trigger-happy surgeons."

The book is well illustrated and indexed. It is simply written in a concise manner appealing to the reader. As an excellent, easily understood, quick reference on resuscitative rather than operative measures, it should be available to all military medical officers and civilian physicians, particularly those who may be called upon to treat mass casualties. —*SANFORD W. FRENCH, III, Col., MC, USA*

ROENTGEN SIGNS IN CLINICAL DIAGNOSIS, by *Isadore Meschan*, M. A., M. D., with the assistance of *R. M. F. Farrer-Meschan*, M. B., B. S. 1,058 pages; 2,216 illustrations on 780 figures. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $20.

This text is written for medical students, residents in radiology, and practicing physicians. It presents the fundamentals of radiology rearranged on the basis of objective signs as seen in roentgenograms. The text is so organized that the limitations and accuracy in roentgen diagnosis are pointed up by demonstrating the technical and anatomic facets behind roentgen signs. It is organized to lead the reader to systematic thinking and analysis of roentgen signs prior to the formation of definitive diagnoses. The author uses this book along with his *Atlas of Normal Radiographic Anatomy* in his teaching of radiology.

There are hundreds of excellent roentgenograms, and numerous line drawings point out details in the roentgenograms. References are kept to a minimum of key articles which will provide additional references. Many of the chapters begin with an anatomy review of the area to be covered in the chapter. Since the author covers practically the whole field of radiology he must necessarily be brief in his discussion.

The book is easy to read, concise, and clear. It is recommended for all radiology trainees, and it will also be a nice addition to any radiologist's library. —*JOHN L. HATCH, Capt., MC, USN*

THE TREATMENT OF FRACTURES, by *Lorenz Böhler*, M. D. Volume I, translated from the Thirteenth German Edition by *Hans Tretter, Helen B. Luchini, Frank Kreuz, Otto A. Russe,* and *Robert G. B. Bjornson.* 5th edition in English. 1,072 pages; 1,721 illustrations. Grune & Stratton, Inc., New York, N. Y., 1956, Price $24.50.

This monumental treatise, which represents the first of three volumes, follows the form used in previous editions on treatment, equipment, and reasons for failure. While there is a considerable expansion of text and in x-ray prints, which are pertinent, and clear examples of points discussed, illustrations are often widely separated from the explanatory text.

Approximately 280 pages are devoted to a general discussion of the treatment of trauma to soft and bony tissue. There is discussed the organization of a fracture service and the x-ray requirements, and also a detailed discussion of essential pieces of apparatus, splints, and special devices for treatment of fractures.

There are many clear illustrations of excellent results obtained in the treatment of severe and complicated injuries of the extremities. The discussion of fractures of the forearm is excellent; however, such statements as "medullary nails . . . should not be used" will hardly be widely agreed with in this country at present. Also the use of the Böhler clavicular "block" splint, as well as some of the devices for abduction treatment of upper extremity injuries, although no doubt successful, are not likely to become popular in American orthopedic practice.

It is still felt by this reviewer that Doctor Böhler's greatest contributions to orthopedic practice are his valuable fundamental principles which are again frequently reiterated throughout the book as in previous editions: (1) Slight shortening (over-riding) should always be the goal in order to insure union. (2) Closed (simple) fractures should be treated by meticulous closed reduction, avoiding open reduction unless critically necessary. (3) Insertion of foreign bodies such as metallic fixation devices and unnecessary sutures should be avoided and skin only should be sutured in open (compound) fractures.

The most serious criticism of this work is that throughout the book there is considerable repetition of statistics and experiences from the pre-antibiotic period, extending as far back as 1914. Granting that there is value in comparing treatment in that period with that at present, it could be more appropriately condensed into a single short chapter for convenient reference.

If one is a complete disciple of Böhler he will find much to delight him and little to criticize in this volume. —*WALTER R. MILLER, Capt., MC, USN*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

OPERATING ROOM TECHNIC, St. Marys Hospital, Rochester, Minn. 5th edition. 359 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

THE RECURRENT LARYNGEAL NERVES IN THYROID SURGERY, by *William H. Rustad,* M. D. 47 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $4.50.

PSYCHIATRIC RESEARCH REPORTS 6, of the *American Psychiatric Association.* "Application of Basic Science Techniques to Psychiatric Research." Edited by Members of the Committee on Research, 1955-56, Jacques S. Gottlieb, M. D., Chairman. Papers presented at the Western Regional Research Conference Held Under the Joint Auspices of the American Psychiatric Association and the University of California, School of Medicine, Department of Psychiatry and Medical Extension, University Extension, Los Angeles, California, January 26-27, 1956. 211 pages; illustrated. American Psychiatric Association, Washington, D. C., 1957. Single copies $2. Orders should be addressed to: Psychiatric Research Reports, American Psychiatric Association, 1785 Massachusetts Ave. N. W., Washington 6, D. C.

PRACTICAL DIAGNOSIS AND TREATMENT OF LIVER DISEASE, by *Carroll Moton Leevy,* M. D. Foreword by *Franklin M. Hanger,* M. D. Illustrations by *Felix Traugott.* 336 pages; 84 illustrations, including 23 in full color. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N. Y., 1957. Price $8.50.

NOTES ON ATOMIC ENERGY FOR MEDICAL OFFICERS, by *The Royal Naval Medical School,* Alverstoke, Hampshire, England. 169 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1956. Price $4.75.

DISCUSSIONS ON CHILD DEVELOPMENT, A Consideration of the Biological, Psychological, and Cultural Approaches to the Understanding of Human Development and Behaviour, edited by *J. M. Tanner,* M. D., Ph. D., D.P.M., and *Bärbel Inhelder.* Volume I: The Proceedings of the First Meeting of the World Health Organization Study Group on the Psychobiological Development of the Child, Geneva, 1953; 240 pages; illustrated. Volume II: The Proceedings of the Second Meeting of the World Health Organization Study Group on the Psychobiological Development of the Child, London, 1954; 270 pages; illustrated. International Universities Press, Inc., New York, N.Y., 1957. Price $10 for set of two volumes.

OCCUPATIONAL THERAPY, Principles and Practice, by *William Rush Dunton,* Jr., M. D., and *Sidney Licht,* M. D. 2d edition. 373 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $8.

KLINISCHE FUNKTIONSDIAGNOSTIK, von Doz. Dr. *Heinrich Küchmeister,* unter mitarbeit von Prof. Dr. *W. Bolt,* Köln; Prof. Dr. *H. Goldeck,* Hamburg; und Dr. *H. Hamm,* Hamburg; mit einem geleitwort von Prof. Dr. *A. Jores,* Hamburg. 411 seiten; mit 152 abbildungen. Georg Thieme Verlag, Herdweg 63, (14a) Stuttgart, Germany, 1955.

DIE LEBERKRANKHEITEN, Diagnostik und Therapie für die Praxis, von Prof. Dr. *Kurt Beckmann,* Stuttgart. 1957, VIII, 253 seiten, 74 zum Teil mehrfarbige abbildungen. Georg Thieme Verlag, Herdweg 63, (14a) Stuttgart, Germany. DM 36. In the U. S. A. and Canada, Intercontinental Medical Book Corporation, New York 16, N. Y. Price $8.60.

DERMATOLOGIE DER MUNDHÖHLE UND DER MUNDUMGEBUNG, Systematik, Morphologie und Grundzüge der Behandlung, von *Aloys Greither,* Dr. Med. et Dr. Phil. Mit Einem Geleitwort von Prof. Dr. *W. Schönfeld,* Heidelberg. 262 seiten; mit 191 abbildungen. Georg Thieme Verlag, Herdweg 63, (14a) Stuttgart, Germany, 1955.

BORDERLANDS OF THE NORMAL AND EARLY PATHOLOGIC IN SKELETAL ROENTGENOLOGY, by Prof. Dr. *Alban Köhler.* 10th edition, completely revised with reference to illustrations and to text, by Dozent Dr. *E. A. Zimmer,* Bern/Fribourg. English translation (from the 10th German edition) arranged and edited by *James T. Case,* M.D., D.M.R.E. (Cambridge). 723 pages; 1,300 illustrations. Grune & Stratton, Inc., New York, N. Y., 1956. Price $24.50.

MODERN OPERATIVE SURGERY, in Two Volumes. Volume II, edited by the late *G. Grey Turner,* LL.D., D.Ch., M.S., F.R.C.S., F.R.A.C.S., and *Lambert Charles Rogers,* V.R.D., M.Sc., M.S., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S., with a foreword by Sir *Gordon Gordon-Taylor,* K.B.E., C.B., M.A., LL.D., Sc.D., M.D., M.S., F.R.C.S., F.R.C.S.E., F.R.C.S.I., F.R.A.C.S., F.A.C.S. 4th edition. 2,614 pages; illustrated. Paul B. Hoeber, Inc., New York, N.Y., 1957. Price $17.50.

CLASSICS IN ARTERIAL HYPERTENSION, by *Arthur Ruskin,* M.D., F.A.C.P. American Lecture Series, Publication No. 290, A Monograph in The Bannerstone Division of American Lecture Series Classics in Science and Medicine, edited by *Wiktor W. Nowinski,* Ph.D., Dr. Phil. Nat. 358 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $9.50.

THE YEAR BOOK OF RADIOLOGY (1956-1957 Year Book Series). Radiologic Diagnosis, edited by *John Floyd Holt,* M.D., and *Fred Jenner Hodges,* M.D. Radiation Therapy, edited by *Harold W. Jacox,* M.D., and *Morton M. Kligerman,* M.D. 430 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1957. Price $9.

PEDIATRIC CARDIOLOGY, by *Alexander S. Nadas,* M.D., F.A.A.P. 587 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

MEDICAL DEPARTMENT, UNITED STATES ARMY. Surgery in World War II. Volume II, General Surgery. 417 pages; illustrated. Editor-in-Chief, Colonel *John Boyd Coates, Jr.,* MC; Editor for General Surgery, *Michael E. DeBakey,* M.D.; Associate Editors, *W. Philip Giddings,* M. D., and *Elizabeth M. McFetridge,* M.A. Historical Unit, Army Medical Service, Office of the Surgeon General, Department of the Army, Washington 25, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $4.25.

CYTOLOGIC TECHNICS, For Office and Clinic, by *H. E. Nieburgs,* M. D. 233 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $7.75.

MANUAL OF ANESTHESIOLOGY For Residents and Medical Students, by *Herman Schwartz,* M. D.; *S. H. Ngai,* M. D.; and *E. M. Papper,* M. D. American Lecture Series, Publication No. 298, A Monograph in The Bannerstone Division of American Lectures in Anesthesiology, edited by *John Adriani,* M. D. 170 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $4.25.

ADVANCES IN PEDIATRICS, Volume IX, 1957, edited by *S. Z. Levine.* 336 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1957. Price $9.

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 66, Art. 2, Pages 233-414, October 5, 1956. Editor-in-Chief, *Otto V. St. Whitelock.* "Natural Resistance to Infections." 180 pages; illustrated. The New York Academy of Sciences, New York, N.Y., 1956. Price $3.50.

ANALYTICAL PATHOLOGY, Treatises in the Perspective of Biology, Chemistry, and Physics, edited by *Robert C. Mellors,* M.D., Ph.D. Foreword by *Eugene L. Opie,* M.D., Sc.D. 477 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N.Y., 1957. Price $12.

LYMPHATICS, LYMPH AND LYMPHOID TISSUE, by *Joseph Mendel Yoffey,* D.Sc., M.D. (Manch.), F.R.C.S. (Eng.), and *Frederick Colin Courtice,* M.A., D.Phil. (Oxon.), D.Sc. (Sydney), F.R.A.C.S. (Hon.). 2d edition. 510 pages; illustrated. Harvard University Press, Cambridge, Mass., 1956. Price $10.

PRACTITIONERS' CONFERENCES Held at The New York Hospital-Cornell Medical Center, Volume 5, edited by *Claude E. Forkner,* M.D., F.A.C.P. 396 pages. Appleton-Century-Crofts, Inc., New York, N.Y., 1957. Price $6.75.

STRAIGHT TO THE HEART, A Personal Account of Thoughts and Feelings While Undergoing Heart Surgery, by *George Lawton,* Ph.D. 347 pages. International Universities Press, Inc., New York, N.Y., 1956. Price $5.

HISTORY OF THE AMERICAN BOARD OF SURGERY, 1937-1952, by *J. Stewart Rodman,* M.D. 104 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $3.

ACCEPTED DENTAL REMEDIES, 1957, Including a List of Accepted Products Together With Other Information Compiled to Promote Rational Therapeutics in Dentistry, revised by *Council on Dental Therapeutics of the American Dental Association.* 22d edition. 214 pages. American Dental Association, Chicago, Ill., 1957. Price $2.

YOU AND YOUR OPERATION, by *Benjamin R. Reiter,* M. D. 150 pages; illustrated. The Macmillan Co., New York, N. Y., 1957. Price $3.50.

MEDICAL DEPARTMENT, UNITED STATES ARMY. Surgery in World War II. Orthopedic Surgery in the European Theater of Operations. 397 pages; illustrated. Editor-in-Chief, Colonel *John Boyd Coates,* Jr., MC; Editor for Orthopedic Surgery, *Mather Cleveland,* M. D.; Associate Editor, *Elizabeth M. McFetridge,* M. A. Historical Unit, Army Medical Service, Office of the Surgeon General, Department of the Army, Washington 25, D. C., 1956. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $4.

PROBLEMS OF AGING, edited by *Robert L. Craig,* M. D. A Symposium presented at the Twenty-Eighth Annual Graduate Fortnight of The New York Academy of Medicine, October 10 to 21, 1955. 240 pages; illustrated; paper cover. Distributed by George Eliot, Medical & Scientific Books, 1302 Second Ave., New York 21, N. Y., 1956. Price $3.50.

LESIONS OF THE CERVICAL INTERVERTEBRAL DISC, by *R. Glen Spurling*, M. D. American Lecture Series, Publication No. 301, A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Neurosurgery Division, edited by *Barnes Woodhall*, M. D. 134 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $4.75.

CHILDREN'S EYE PROBLEMS, by *Emanuel Krimsky*, M. D. 175 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956, Price $6.

A. M. A. Scientific Exhibits 1956, Sponsored by *Council on Scientific Assembly, American Medical Association.* 411 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $10.

THE TREATMENT OF FRACTURES, by *Lorenz Böhler*, M. D. Volume II, translated from the 13th German edition by *Otto Russe*, M. D., and *R. G. B. Bjornson*, M. D. 5th edition in English. Pages 1073-1508, Chapters 49 to 74. 941 illustrations. Grune & Stratton, Inc., New York, N. Y., 1957. Price $17.50.

A MATHEMATICAL GUIDE TO DOSAGE AND SOLUTIONS, by *Alice C. Cook*, B. S., R. N., and *Katherine E. Davidson*, B. S., R. N. 190 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

THE PHYSICIAN-WRITER'S BOOK, Tricks of the Trade of Medical Writing, by *Richard M. Hewitt*, M. D. 415 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

PEDIATRIC CLINICS OF NORTH AMERICA, Symposium on Respiratory Disorders, February 1957. *Waldo E. Nelson*, M. D., Consulting Editor. 321 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

CLINICAL USE OF RADIOISOTOPES, by *William H. Beierwaltes*, M. D.; *Philip C. Johnson*, M. D.; and *Arthur J. Solari*, B. S., M. S. (Physics). 456 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

MENTAL HEALTH ADMINISTRATION, by *Jack R. Ewalt*, M. D. 168 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $5.50.

THORAX, Volume II, No. 4, December 1956, edited for the Thoracic Society (President, George Mason), by *N. R. Barrett* and *J. G. Scadding*. Pages 257-342; illustrated. Published by British Medical Association, Tavistock Square, London W. C. 1, England. Price $7, yearly subscription (4 numbers); single numbers, $2.25.

THE YEAR BOOK OF GENERAL SURGERY (1956-1957 Year Book Series), edited by *Evarts A. Graham*, A. B., M. D., with a section on Anesthesia, edited by *Stuart C. Cullen*. M. D. 647 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.75.

FUNDAMENTALS OF CLINICAL FLUOROSCOPY, With Essentials of Roentgen Interpretation, by *Charles B. Storch*, M. D. 2d revised edition. 305 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1957. Price $8.75.

DISEASES OF THE HEART AND CIRCULATION, by *Paul Wood*, O. B. E., M. D. (Melbourne), F. R. C. P. (London). 2d edition. 1,005 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $15.

AMERICAN DRUG INDEX 1957, by *Charles O. Wilson*, Ph. D., and *Tony Everett Jones*, M. S. 650 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $5.

U. S. GOVERNMENT PRINTING OFFICE: 1957 O -416757